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ABSTRACT

An annotated bibliography of material in the fields of education, languages and linguistics, and computer technology is presented. The bibliography describes over 250 journal articles, books, conference and workshop proceedings, booklets, and pieces from diverse publications. The entries are organized by date of publication (1960s and 1970s as a group, and yearly after 1979). An unannotated bibliography focuses on computers in education and ESL/language learning. A resource guide provides lists of organizations, clearinghouses, journals and periodicals, public domain software, vendors, catalogs, and upcoming and undated publications. (MSE)

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ANNOTATED BIBLIOGRAPHY
of Publications Concerning Computers in Education: Emphasis on Microcomputers in ESL and Language Learning

Accompanied by an Unannotated Bibliography and Resource Guide to Computers in ESL/Education

Compiled by VANCE STEVENS, Instructional Developer
Language Centre, Sultan Qaboos University, Muscat, Oman

Date of this Revision: September, 1985

--**- In the 1960's and Early 70's -**--

Bauer, J., J. Magerlein, and N. Sherman. 1971. DITRAN: A program for translating physics dialogs into templated conversational CAI programs. American Journal of Physics 39: 1517-1521.

This article describes a prototype CAI authoring language. The template herein described is significant in that its developer was able to reduce logic for interactive programming to one template, and that this template enables the programmer to design conversational lessons without having to use a programming language.

Curtin, Constance, Douglas Clayton, Cheryl Finch, D. Moor, and L. Woodruff. 1972. Teaching the translation of Russian by computer. The Modern Language Journal 66,6 (October):354-360.

The experiment compared a group working in a conventional classroom setting with one working with the same material presented on PLATO. Students in the former setting reported on average spending 6 hours preparing for work that students using PLATO took 2 hours to prepare. Since there was no significant difference in grades between the two groups, it is concluded that PLATO helped students to learn the material more efficiently.

Davidson, Melvin, George A. Gerhold, and Larry Kheriaty. 1978. Computer Assisted Instruction on a Microcomputer. Byte, November, Vol. 3 #11: 90-94.

Noting that "computer assisted instruction (CAI) could alter the delivery of education profoundly," the authors feel that near-future development of the medium will, for economic reasons, be on microcomputer. However, CAI on microcomputer is at this writing hampered by "the lack of quality courseware." To overcome this problem, high level programming languages must be made accessible to "experienced teachers as authors", who may themselves know little about computers. Having worked with IBM Coursewriter and its offshoot, CW3-WPL, as well as with PILOT, the authors feel "that a PILOT/BASIC composite is currently the optimal language for CAI." (p. 90)

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The authors go on to briefly describe the PILOT instruction set. Of greatest significance is the capability that the authors had (using a Southwest Technical Products 6800 microcomputer) of using PILOT's compute instruction to embed BASIC statements into their programs. "There are limitations on the BASIC statements which can be included directly in a C: instruction, but because one of the legal statements is the CALL statement, the C: instruction imbeds the entire extended BASIC language into PILOT." (p. 92; cf Smith, 1982)

Edwards, Judith, Shirley Norton, Sandra Taylor, Martha Weiss, and Ralph Dusseldorp. 1975. How effective is CAI? A review of the research. Educational Leadership 33, 2: 147-153.

A review of recent comparisons of CAI to other methods of instruction reveals the following about the effectiveness of CAI:

(1) CAI used in conjuntion with traditional methods is more effective than normal instruction alone. Students using the combination of methods did .2 to .6 grade levels better than those in the control groups, and time to achieve a certain reading standard was cut from 7 to 4 months.

(2) CAI used in lieu of traditional methods -- 9 studies showed improvement, 8 showed no difference, and 3 showed mixed results.

(3) Compared with other non-traditional methods of instruction (tutoring, language lab, PI, and filmstrips), CAI was shown to be equally effective.

(4) Studies show that learners learn material in one eighth to one half the amount of time using CAI than it takes them using traditional methods.

(5) Retention of material learned by CAI has been shown in two studies to be not as good as with traditional methods, and in one study to be about equal to retention using traditional methods.

(6) CAI has been found to be more effective with low ability students than for students of high ability (but this is not borne out by Kulik et al., 1980).

Farrell, Edmund J. 1971. Deciding the future. Urbana, IL: National Council of Teachers of English.

As reported in White (1984:61), Farrell predicts that "Computers will be accessible to both students and teachers for a variety of purposes. Through the computer, students will be able to retrieve data on demand from multi-media, multi-mode data banks; further, they will have access to computers through telephone lines in their homes. To lighten the teacher's load, the computer will compile students' records and provide continuous reports of students' progress. Equipment for computer-assisted instruction will include cathode ray tubes and teleprinters. The computer will control videotape, "light pencil", and audio-response systems which allow for flexible input and output. A conversationally interactive language, machine-independent and available for execution of instructional programs on many computers, may eventually facilitate the use of computer-assisted instruction." (p. 125)

Hammond, Allen L. 1972a. Computer-assisted instruction: Many efforts, mixed results. Science 176: 1005-1006.

Computers have been "oversold ... the revolution in the classroom predicted by the most ardent proponents of CAI has yet to take place." Papert, on the one extreme, stresses the cognitive and manipulative aspects of computer assimilation by children, while Suppes at the other works on drill and practice math exercises using "psychological learning theories." The results of the former efforts are difficult to quantify, while the results of the latter do not seem to measure any better than conscientious drill by a teacher. Meanwhile, a very popular computer-based Russian course at Stanford was discontinued "because it cost more than three times as much as one taught by an instructor."

Despite successes with CAI at Dartmouth and in the military, "there remains considerable skepticism in many parts of the educational community as to the future role of the computer in education." Businesses are hesitating to commit themselves to CAI, and popular acceptance of computerized instruction is tempered by ingrained resistance and by problems with system reliability and with phone connections. Thus, in this view from a decade past, CAI is having problems on the launching pad.

Hammond, Allen L. 1972b. Computer-assisted instruction: Two major demonstrations. Science 176: 1110-1112.

Following on the heels of the article above, Hammond compares TICCIT and PLATO. The former system "hopes to demonstrate that low cost CAI is possible with existing small computers and, moreover, that it is possible to combine the computer with color television technology." The TICCIT system is geared to "substantially eliminating" the need for a teacher and to giving the student great control over his own learning, holding his interest through attractive video programming. PLATO works with a centralized computer and attempts "to improve the productivity of teachers rather than to replace them." The TICCIT system was designed to be managed by a single technician per institution, and would cost 35 cents per student hour, as opposed to 50 to 80 cents for PLATO.

Jamison, Dean, Patrick Suppes, and Stuart Wells. 1974. Alternative instructional media. Review of Educational Research 44, 1: 1-67.

This article is a comprehensive review of recent research in various instructional media. The last two sections deal with programmed instruction and computer-assisted instruction, respectively.

PI being a precursor of CAI, many of the techniques and principles in the former can be translated to the latter. Jamison et al. approach the subject by surveying several previous reviews of PI research, then reviewing a few research projects themselves. Most of the studies mentioned attempted to compare PI with some form of traditional instruction. A pattern that seems to emerge from the reviews is that PI is generally as effective as or more effective than TI, and that it takes less time to complete PI. Attitudes received little attention in the studies reviewed, but where they were studied, "responses were generally favorable"; however, in three studies, "interest decreased with time." (p. 39) Mastery learning, in which a student must master one component of PI before proceeding to the next, is also discussed. All but four of the 28 studies mentioned here "favored mastery learning." (p. 40)

Of the studies the authors selected for more focused attention, it was found in one case comparing PI to TI that a group having used PI performed better on a recall examination three years after the original study. In another study, it was found "that an easy program with short steps is better suited to persons who are low on need for achievement and high on fear of failure or test anxiety," and that for a hard program with long steps, the reverse is true (p. 40 -- these results were not replicated in a succeeding study). In still another study comparing two PI texts with TI, one PI text was found superior to the other, and this seems to have been the only study taking differences in PI materials themselves into consideration. In the same study, students using PI plus TI did better than students using either method alone, and those using PI alone saved time over those using TI.

In conclusion, Jamison et al. note a shift in emphasis in research on PI "from direct comparative studies of effectiveness to detailed studies of how to improve the programs, how to increase student interest, and how to adapt PI to unusual educational settings." (p. 41)

While noting that CAI is the most expensive of the methods surveyed, the authors mention that it "provides the richest and most highly individualized interaction between student and curriculum ..." (p. 42) Whereas reduced dependence on computer-based research centers will soon open more possibilities for development and evaluation, as of this writing, there had been relatively few studies of the effectiveness of CAI.

The first studies reported here tested drill and practice CAI plus TI vs. TI alone at the elementary level. Generally, CAI was found to be more effective than or at least as effective as TI alone, but in one study, in which teachers provided extra help to students, TI was shown to be more effective. Even so, the point is made that CAI "took less time and did not require an additional effort from the teacher." (p. 43) Also, CAI was often found most effective with students whose skills were deficient. It should be noted that significance was reached in studies where students received about ten minutes drill and practice per day, but in one study, failure to produce results was blamed on the fact that students received drills for only fifteen minutes per week.

At the college level, studies comparing physics students receiving mostly CAI, CAI plus TI, and only TI showed the mostly CAI group to be superior, and that the other two groups tested out approximately equal. In further tests with a slightly different design, all groups came out equal, but "CAI seemed to truncate the distribution of lower grades." That is, students doing mostly CAI received fewer low grades than did the TI groups. Another study found lower operating costs for CMI than for TI for about the same amount of learning. Still another experiment compared TI with three different

CMI treatments, each varying pace through the course. In this study, the CMI groups were deemed statistically superior to the TI group, and it was found that a mastery approach was the most effective of the three CMI strategies.

Languages have occasionally been the focus of research in CAI. In one such study, the experimental group received CAI lessons in reading and writing German in place of language lab. This resulted in "substantially" better reading and writing skills for the experimental group, and in "generally favorable student attitude to CAI." (p. 51) At Stanford, a two year tutorial "completely replaced" a five-hour a week Introductory Russian course with equal or better learning by the students, and with half as many students dropping out as in the same course taught with TI.

Most studies compared CAI to TI, but one compared learner controlled CAI to a program controlled strategy. "Student control of progress through a course seems to be successful in subjects in which the student has competence, and it seems definitely less successful when the student's competence is low, or when he has little familiarity with the course material on the basis of past experience. This study illustrates how difficult it is to obtain strong conclusions about how learner control should be built into CAI courses. As in other areas of research on the effectiveness of instructional methods, interaction between the cognitive and affective states of the student and the structure of instruction will certainly be a major focus of investigations in the next few years." (pp. 52-3; and see, for example, Boettcher 1981; Chapelle & Jamieson 1985 manuscript)

Overall, Jamison et al. feel that no general conclusions have been reached proving the superiority of CAI. "Findings of no significant difference dominate the research literature in this area." They also mention that no concrete evidence has yet shown how CAI costs can be recouped through lower teacher-student ratios. However "substantial evidence suggests that it leads to an improvement in achievement, particularly for slower students." (p. 56) Also, time needed for learning is often reduced, by as much as half, for students using CAI. If CAI is at least equally effective to TI, then "real opportunities should exist for substituting capital for labor, especially as the relative costs of technology in comparison to labor decline over the next decade." (p. 55)

This is particularly important in light of the fact that whereas lately the cost of education, boosted especially by cost of instructional labor, has increased dramatically in American and British schools, there has been no concomitant increase in productivity. "Augmentation of human effort by technology" (p. 57) has reversed similar situations in other sectors, and it seems likely that technology could be used to increase productivity in education. But as of yet, no studies have been carried out showing how "instructional costs can be reduced without sacrificing quality ..." (p. 58) This then would be an important focus of research in this area. In searching for such a breakthrough, it should be kept in mind that up to now, most studies have been done with CAI etc. closely emulating the TI with which they are compared. "It is at least plausible that many of the conclusions of this survey would be overturned were more imaginative uses of the media explored, which still permit comparative evaluation." (p. 59)

Moore, Omar Khayyam and Alan Ross Anderson. 1969. Some principles for the design of clarifying educational environments. Reprinted in Greenblat, Cathy and Richard S. Duke (Eds.). 1975.
Gaming-simulation; rationale, design, and applications: A text with parallel readings for social scientists, educators, and community workers. New York: John Wiley & Sons. pp. 47-71.

This article is not about computers per se, but it establishes an excellent theoretical base for using computers as "clarifying educational environments". First, Moore and Anderson establish the concept of folk models, which are games and rituals that societies have evolved to initiate their members into mores and functions crucial to those societies. In these folk models, participants suffer no real consequences of actions taken. Play within the model is intrinsically motivating and is taken seriously by all players. The four kinds of folk models are puzzles, games of chance, games of strategy, and aesthetic entities, and these offer their participants agent, patient, reciprocal, and referee perspective on a learning task, respectively.

From this groundwork, Moore and Anderson go on to define clarifying learning environments. There are four principles in the creation of such environments. These are that the environment must (1) offer various learning perspectives, (2) be autotelic, (3) be productive, and (4) be personalized. That is, a learning environment will allow "more rapid and deeper" learning (p. 60) if

1. the learner has options over which perspective he may approach his task (perspectives principle),
2. if the environment is non-threatening and can be explored for its own sake (autotelic principle)
3. if what is learned can be applied generally in the larger world (productive principle),
4. and if the environment is both responsive and reflexive (personalization principle).

Although computers are never mentioned in this article, it should be apparent that they are highly capable of implementing these four principles, and hence that it is possible to create clarifying learning environments with CAI.

Smith, Stanley G. and Bruce Arne Sherwood. 1976. Educational uses of the PLATO computer system. Science 192: 344-352.

This is a description of PLATO, whose capabilities include student programmable simulations of experiments using advanced graphics, and a plasma screen that responds to touch by means of infrared light emitting diodes and sensors arrayed around the edge of the screen. PLATO can also control the projection of color slides onto the plasma panel.

PLATO's ability to monitor student progress yields useful data which can be utilized in modifying the lessons, or just in learning about how students study. For example, it has been found that "the time required for the students to complete the lesson often varies by a factor of 3 to 7." (p. 347) Criteria have been established as to what percentage correct indicates that a lesson is not challenging the students or is too difficult for them. Also, provision has been made "to adjust to each student within each section." Toward this end, the system allows exit and reentry at almost any point, the ability to review, HELP when requested, branching to remedial lessons, and pass-on if the student gets a certain percentage correct in a section. Finally, student performance on PLATO is integrated into students' grades through an elaborate CMI system, which can be manipulated by instructors keeping track of the students' grades for entire courses, and not just for what is done on PLATO.

Language courses use plato for drill, translation, and testing. Lessons are written in TUTOR language. Authors have many advantages over authors in other systems; for example, they can communicate with consultants from their terminals or access the AIDS package from (and return to) wherever they are in their work. They can also relatively easily mix text and graphics. In addition, authors can page one another and display on each other's screens whatever they are working on. It is estimated that 10 to 50 hours are spent at the terminal producing an hour of student interaction (with "some" additional planning time).

"The time or money costs of producing a PLATO lesson, which is one "chapter" of a PLATO course, are probably similar to the costs of producing one chapter of a textbook. Generally speaking, curriculum costs have been much higher on other computer-based systems, but PLATO offers significantly improved aids to authors." (p. 350)

Tying many terminals to one computer finesses compatibility problems. Also, it allows an accounting of royalties to be paid to authors, and thus provides some incentive to quality lesson production.

It is difficult to assess the value of PLATO by standard means; the authors offer the following justification for developing the system:

(1) Students do as well or better with PLATO compared with similar courses where PLATO is not used. They turn in work complete and on time more regularly than is done in other courses, although they do not do significantly better on exams.

(2) Frequent surveys show a strong positive student reaction to PLATO well beyond the novelty stage.

(3) Instructors like PLATO.

Expenses of PLATO include terminals, maintainance & salaries, and telephone connections, but the cost is offset by heavy use. In 1975, each terminal on the system averaged 1300 hours use. In addition, the system uses innovative trickery to swap out users and make each one think that he or she is in constant touch with the computer. Users have access to over 3500 hours of lessons (as of 1976).

Steinberg, E.R. 1977. Review of student control in computer-assisted instruction. Journal of Computer-Based Instruction 3,3:84-90.

According to Hartig (1984:114), Steinberg identifies external control as being a requisite for success in CAI implementation. This would be contrary to numerous other findings, including that of this bibliographer (Stevens, 1984, on giving students choice and control).

Vinsonhaler, J. F., and R. K. Bass. 1972. A summary of ten major studies on CAI drill and practice. Educational Technology 12: 29-32.

Noting that at first glance, failure to reach significance seems to characterize studies comparing CAI with traditional media of instruction, Vinsonhaler and Bass find that closer scrutiny of the literature reveals that when drill and practice was used and the results measured by standardized achievement tests, "there seems to be strong evidence of the effectiveness of CAI over traditional instruction." (p. 29) In addition, the authors note that "Generally, CAI groups show performance gains of one to eight months over groups receiving traditional instruction," (p. 29) although tapering results were noted in at least one study, which the authors attribute to "a loss of the novelty effect of CAI that was present in the first year study." (p. 31)

By drill and practice, the authors mean "CAI systems designed to assist a learner in the maintenance and improvement of a skill" (p. 30), as opposed to tutorial systems, which are designed to assist in acquisition. Studies in these surveys were all for Language Arts and Mathematics classes, and involved around 10,000 subjects. In conclusion, the authors call for further "studies which compare CAI with other nontraditional methods of instruction and which attempt to identify the underlying bases for the CAI effects. With regard to the latter, we presently do not even know the major sources of the advantage of CAI over traditional instruction." (pp. 31-32)

--**- 1979 -**--

Banet, B. 1979. Computers and early learning. Calculators / Computers 3:17.

According to Perez & White (1984:39), this article formulates "broader explanations of motivational qualities based on research with arcade games."

DeBloois, Michael. 1979. Exploring new design models. Educational and Industrial Television 11, 5: 34-36.

In this article, one of several on videodiscs in this issue of Educational and Industrial Television, a paradigm for lesson and materials development (which is referred to in Allen 1982) is presented and discussed in light of the ramifications of accomodating new educational technologies.

DeLorenzo, Ronald A. 1979. Computer assisted instruction and computer test construction. T.H.E. Journal (Technical Horizons in Education) 6, 5: 50-51.

This brief article relates the author's experience as computer coordinator at Middle Georgia College. As such, it may be of interest to those who have not yet implemented their own programs, or who are looking for PLATO compatible software to share. In the last paragraph is summed up the "minimum need" for selecting and supporting a computer coordinator. First, the coordinator should have release time from teaching (DeLorenzo notes that his institution is unique in this respect) and second, he should be "somebody from within the existing academic ranks (i.e. not a computer major) ... who has demonstrated an active interest in CAI in his own area and who can enthusiastically extrapolate his experiences to assist faculty in othe academic areas." (p. 51)

Evans, Christopher. 1979. The mighty micro. Victor Gollancz Ltd.

Evans' superb book is to the 80's what Alvin Toffler's was to the 70's. This is recommended, enjoyable, and fairly convincing reading. (cf Day's review, 1981.)

Fox, Jean and Nick Rushby. 1979. Guidelines for developing educational computer programs. Computers & Education 3: 35-41.

A CMI user package was developed under the auspices of NDPCAL in the U.K., with help from International Computers Ltd., the British computer firm. "Since errors and other problems affect the users' confidence, and hence their acceptance of educational computing, reliability is of paramount importance." Also, since there was no way for the institutions alone to maintain the software after its implementation, close coordination with the educational institutions after implementation was anticipated. The system was designed to utilize existing hardware, and great attention was given to appropriate documentation, again on the philosophy that this would enhance user confidence. Finally, a manual simulation was arranged in Ulster in a final effort to turn up last minute glitches in the system.

This article presumes that a programmer will be necessary to design and actualize what the academic envisions, describes, and eventually uses. Hence, some attention is given to stages in this cooperative development. Problems in writing programs so that they will be transferable from one machine to another are also discussed. In all, 80 hrs. of programming, 45 of testing, and a day and a half of consultancy was necessary to make CAL01 a usable program. Further modifications might be needed once students attempt to "break the model". All this effort was made on the assumption that for software to be successful, it must be "unobtrusive" and highly reliable.

Hawkins, C. A. 1979. The performance and the promise of evaluation in computer based learning. Computers & Education 3: 273-280.

Hawkins preceeds his examination of two studies of Plato programs in the Urbana area with a few pages on what evaluation is and how evaluations can vary markedly from one another depending on such factors as whether they measure qualitatively or quantitatively, and to what audience they are addressing themselves. Problems with evaluations are discussed, and these prove interesting in light of the two very different evaluations considered here.

Conclusions from the ETS evaluation were that "The PLATO system had no consistent positive nor negative effects on student achievement nor attrition." However, it was used exceedingly and well liked. The House and Gjerdt qualitative study tells us that the software wasn't ready, that the terminals were often out of order or in use, and that the system was down 50% of the time. On the other hand, enthusiastic but computer naive teachers managed to produce materials, even if some simply transfered their own lecturing style to blocks of text on PLATO. Users at the outset thought that drill and practice would be the best use of computer time, but simulation was ultimately thought to be most useful. Of further significance is the fact that PLATO was developed largely with neither financial nor doctrinal constraints, and this has been cited as one of the reasons for its success.

This review of these two evaluative studies generates doubt as to the degree of that success. "If a programme is well liked, and produces positive attitudes to computers, but leaves you where you were with college students who cannot spell, cannot write, cannot add, subtract, multiply or divide, then can the programme be endorsed on the evidence that these studies have assembled?" More pertinently, can decisions be taken on the basis of these seemingly contradictory evaluations? If not, what was the purpose of going to the trouble and expense of evaluation?

Howe, J. A. M. and B. Du Boulay. 1979. Microprocessor assisted learning: Turning the clock back? Programmed Learning and Educational Technology 16, 3: 240-246.

The authors of this article are with the Department of Artificial Intelligence at the University of Edinburgh, Scotland. Their message is that using the computer for drill and practice is not the direction in which CAI should be going. In the abstract (p. 240) they say that "Programs which attempt to be surrogate teachers are unlikely to be usefully transferred to microprocessors ... because of their restricted educational objectives (e.g. drill and practice programs) ..." In their experience, they have found that students tend to anticipate the computer, or simply hit the help button for the correct answer rather than use the computer in a cognitive way. "Such behaviour is by no means unique and serves to reinforce our opinion that the widespread use of drill and practice programs would amount to turning the clock back to an earlier era in education. No matter how acceptable this might be to members of the 'back to basics' movement, it is at odds with current educational beliefs and would constitute an abuse of the potential of advanced technology."

James, Edward. 1979. Review of C.E.T.'s microelectronics: Their implications for education and training. PLET 16, 2: 183-184.

"The continually increasing people-costs involved in the production of good teaching materials will far outweigh the savings due to the employment of microelectronics, unless there can be very extensive communal use of the materials." (pp. 183-4)

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Leveridge, Leo L. 1979. The potential of interactive optical videodisc systems for continuing education. Educational and Industrial Television 11, 4: 35-38.

The description here is mainly of what Onosko (1982) would call a built-in micro videodisc. Advantages and disadvantages of videodisc to video tape are catalogued and compared. Among the advantages are speedy access (5 sec. max) and the no-wear aspect of videodisc use through nill handling and through laser beam reading (which allows for wear-free freeze framing). In addition, it is noted that videodisc image quality surpasses that of video tape players, and that hookups with existing CAI (such as PLATO) is possible. However, in mentioning cheap reproduction of videodiscs, Leveridge ignores the very significant initial production costs (see Kehrberg and Pollack, 1982).

"Educational program designers and producers must learn new methods of designing and producing programs if they are to make full use of interactive and other capabilities of the the disc systems." (p. 37) Indeed, the temptation will exist to copy existing video taped materials onto videodisc, but this urge should be resisted at all (and considerable) cost. Old habits of thinking in terms of linear organization must yield to "new kinds of creative thinking ... To gain the benefits inherent in this new system, it will be necessary to think in new terms for program design and production." (p. 38)

An interesting scenario for the future is depicted, based on the assumption that "Eventually, each learner will have his own microcomputer with attached videodisc player and television set." (p. 38) Decreased reliance on phone-linked CAI bases and increased decentralization of CAI will ensue. Furthermore, the same devices that aided in learning will follow students into their professional lives, allowing for remediation of deficiencies "immediately while motivation is high and memory is fresh."

Molnar, Andrew R. 1979. Intelligent videodisc and the learning society. Journal of Computer-Based Instruction 6, 1: 11-16.

Society's ability to absorb and utilize new information is crucial to its development. Meanwhile, existing educational systems have peaked in efficiency, compounding effects of the new "ignorance revolution" (which is exacerbated by the proclivity of many scholars for contributing to the recent phenomenon of "information pollution"). The electronic revolution can help ameliorate the situation, although the increased use of digital (binary?) numerals is no less radical than was the shift from Roman to Arabic. New technologies will be able to combine the benefits of both right and left hemisphere learning, but not using current educational paradigms.

A recent HumRRO conference reached the following conclusion: "The conference participants considered videodisc to have the most promising near-term technological applications for education ... " (p. 13), leading to development of "intelligent electronic books". However, "conventional approaches to research and development are generally inappropriate if one wishes to foster innovation." (p. 15) In order to develop intelligent video, a prototype must be built and used, and toward this end, "the Federal Government must be the primary source of funding."

Nugent, Gwen. 1979. Videodiscs and ITV: The possible vs. the practical. Educational and Industrial Television 11, 8: 54-56.

One illustration of the capacity (in bits) of videodiscs has been the oft-stated claim that the Encyclopedia Britannica could be stored on one. Here it is revealed that in this format, the EB would be impossible to read. Also, the expense of frame accurate video tape editing may actually preclude large scale production of videodisc still frames. Furthermore, keeping track of 54,000 frames of data is cumbersome. Therefore, in working with the new videodisc players, "Design possibilities must be carefully balanced against the realities of the production and utilization contexts. In short, what is possible may not be practical." (p. 56)

Rudnick, Martin F. 1979. Now you can program the computer in English. Audiovisual Instruction 24, 4: 36-37.

Rudnick reports on the Instructional Dialog Facility, the authoring and CMI package developed for use with Hewlett Packard computers. In this article, he basically describes how it works. One word of advice: "In a well designed program, 90% of the students should get 90% of the frames correct." (p. 37) See also Stevens (1980) and Stevens (1981) for reports of a CALL implementation using IDF.

Scanlon, Robert G. 1979. A Missing link in the system. T.H.E. Journal (Technical Horizons in Education) 6, 5: 35-37, 39.

Having noted that computers are slated to "revolutionize the way we teach our youth," Scanlon suggests that "It is time to move forward and show that the computer can work in the schools with the same effectiveness and efficiency with which it has influenced other areas of living." Toward this end, Scanlon isolates eight variables that "can be manipulated to increase student learning outcomes." These variables are:

(1) Time -- "self paced materials ... can make instruction available with greater time flexibility ... The time span of instruction can also be modified according to individual need." (quotes so far, p. 35)

(2) Interrelationship of instruction across grade levels and individual classes -- "can be monitored and designed by technology for each student ... so that classes, or grade levels, will be a continuous instructional program."

(3) Teacher characteristics -- "Impatience, a common attitude among teachers who give continuous student drill exercises, can be halted by using terminals to teach skills."

(4) Correlations between goals, contents of instruction, and measurement of student achievement -- Although some classroom instruction may be far removed from school district goals, "Any

curriculum or class that has a specified set of measurable instructional objectives can be part of a computerized total management system."

(5) Instructional organization -- "the extent to which classroom instructional activities are focused, structured, and related to student needs," can be improved with technology, and remedial action can be immediately taken when such activities are found to be not relevant to student needs.

(6) Degree of instruction and student interaction to incourage learning -- "Terminals, like private tutors, can increase constant interchange between instuction and student ... give immediate feedback and reinforcement, and permit students to seek and obtain help to appropriate materials."

(7) Classroom control -- minor but interfering interruptions and discipline problems can be eliminated with use of terminals.

(8) Appropriate and attractive instructional materials, and the availability of methods of instruction -- "more quality time in selecting appropriate and attractive materials <and> The availability of alternative instruction methods," are two useful features of CMI. (p. 36)

Scanlon, who is Sec. of Education for the Commonwealth of Pennsylvania, goes on to relate how the state's schools are making use of computers to forge linkups to industry, business, and to educational research and employment services and the like. Also, computers are being used in conjunction with the Bell System to enhance communication and reduce paperwork. In addition, "technology courses for all school personnel" (p. 37) are being implemented so that the human element will be in synch with the strides in technology being planned. All this is being undertaken in keeping with Scanlon's view that economic exigencies increase "the probablity that education will undergo changes in the near future," and that "the future of education demands participation in a technological society in order to survive." (p. 39)

Woolley, Robert D. 1979. Microcomputers and videodiscs: New dimensions for computer-based education. Interface Age 4, 12: 78-82.

This is mainly a description of the medium, along with brief descriptions of programs produced. The "Issues and Features" section is also valuable reading. For example: "Obviously the market will be moving rapidly in the direction of digital audio and digital video ... many of our old ... constraints will begin to disappear." As to cost, "Optical disc technology appears to be a viable competitor for all projected mass storage media both in terms of upper boundary limits of storage and user cost per bit. Both hardware and media costs appear to be competitive with, and less expensive than, existing technologies." Moreover, micro-video "is not technologically clumsy." (all that, p. 81)

Still, the $64K question is: will interactive video surpass the old CBE systems, or "will we merely effect an improvement in attitude with little corresponding improvement in learning?" (p. 82; cf Hawkins 1979)

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Allee, John G., Jr. and Robert L. Williams. 1980. A Challenge for the Language Arts CAI Developer. Creative Computing, September: 120-125.

Computers can be used in CAI "dynamically in ways far superior to the traditional textbook, if ..." This article elaborates on the nature of the "if".

"The terminal's interaction is immediate -- this is perhaps its chief asset to the student. However, the quality of the interaction is limited." (p. 122) Limitations can be partially overcome if (1) the terminal does not merely replicate a textbook, (2) if interactive powers are fully utilized and contextualized, and if the student is drawn personally into the process (as in the case of the young learner, by inputting his own name and names of classmates).

Conclusions are five-fold:

1. Grammar lessons can be well contextualized using CAI.
2. Students can themselves become part of the context.
3. Careful programming control is needed to affect 1 & 2.
4. Effectiveness of CAI falls between that of teacher and that of a text.
5. The affect of an adept teacher plus adept CAI is greater than that of an adept teacher plus a static text.

In short, this article illustrates how grammar can be taught dynamically through judicious use of CAI. However, some of the ideas on language and grammar seem half baked, and the assertions are not backed up by any data as to actual effectiveness.

Booker, Laurence A. 1980. Bringing Your Students into the 21st Century. Interface Age, October: 92-94.

A course designed to teach students how to communicate in computerese is described here. General in nature, the article gives an example of one school's attempt to teach its students how to cope with a computerized future.

Braun, Ludwig. 1980. Computers in Learning Environments: An Imperative for the 1980s. Byte, July, Vol. 5 #7: 6-10 & 108-114.

According to Braun, there are 3 reasons why the role of computers in education has been minimal: (1) lack of good courseware, (2) educators' lack of computer training, and (3) cost. Cost of computers should be reduced by a factor of two by 1985. There are compelling arguments for ameliorating the other factors too, such as:

A. The educational system in the U.S. is performing to reduced standards on a number of counts. There is "evidence" that computers can help on these counts. Cited are studies showing that computers motivate students to attend classes and help reduce attrition for relatively low expenditures per student. Other studies show that performance on certain exams is improved and/or learning time is saved when a course of instruction is augmented by CAI.

B. It is in the national interest that computer literacy be achieved.

C. "It is imperative that computers enter our educational system in an orderly, intelligent manner, in contrast to our experience with television." (p. 110) Television, dominated by commercial interests, has become a wasteland. Computers could in the future reflect what is now found at video game arcades unless educators act now. (cf Burke 1981)

D. Disparities in resources currently available to poor and rich school districts result in computers being available only to the rich, thus widening existing gaps.

E. The present system is at maximum effectiveness. No increase in funding will improve output, only a radical change in technology (see Dede, 1980). The analogy with books being newly implemented in 1478 is used. (cf Campbell 1980, Jamieson & Chapelle 1980, others)

Several countries have acted on a national level to bring computers into classrooms (i.e. the French "10,000 Computers in the Schools" program; cf Urrows & Urrows 1982). The U.S. on the other hand lacks "national focus" and hence suffers inadequate funding. The private sector will not gear up until a market develops, but the market (educators) are holding back until the producers produce; hence a vicious cycle has taken hold. To break this hold, federal funding is needed ($1 to $3 million a year). Some indication of the level of government concern is that national centers for computers in education were recommended by the Carnegie Commission on Higher Education in 1972, and that a bill was submitted to the House of Representatives in 1979 to actually establish one.

Burke, Robert L. 1980. Microcomputers: The Greening of Education. T.H.E. Journal (Technical Horizons in Education), February, Vol. 7 #2: 41-42.

Burke sees computers as "capable of enriching and enhancing education by improving the efficiency of human communication in education." Computers will become more ubiquitous as their cost decreases, as their capabilities increase, and as they become "friendlier" and more easily operable by non-computer personnel.

Some of the interesting applications to which Burke sees computers being put (applications "which have arisen as a result of the proximity of microcomputers and their users.") are:

1. Making brainstorming sessions more productive and less time consuming.
2. Computer conferencing
3. Message forwarding, in which the computer can call someone at low rate times (and leave a message with the latter's computer).
4. Electronic journal -- graphics and working draft dissemination and critiquing.
5. Decentralized campuses with greatly inhanced interaction between students and professors (all of which would be public record, thereby reducing reduplication of effort). This presupposes that each person would have his or her own computer, that homework and papers would be done on the system, and that the professor could take advantage of CAI and CMI techniques in assigning and assessing work. ("Students could be expected to do greater amounts of more relevant homework because of the added efficiency of the microcomputer

system.")

6. Text processing ("Some authors estimate that the microcomputer doubles their rate of output capacity.")

7. Library research ("In many schools, students have available to them no less than 97 data bases for research purposes right at this momemt.")

Burns, Hugh L. and George H. Culp. 1980. Stimulating Invention in English Composition through Computer-Assisted Instruction. Educational Technology, August: 5-10.

This is a thought provoking article about how the computer can be programmed to elicit invention from students in the prewriting stage of composing. It's a good illustration of how the computer can be used in ways other than for "drill and practice". (See also Lawler 1982.)

Campbell, J. Olin. 1980. 2D Simulation: Educational Breakthrough. Interface Age, October: 86-90.

Campbell echoes the idea that the educational system has reached maximum efficiency, and that "better tools" are essential for further educational breakthroughs (cf Braun 1980, Dede 1980, others). Using 2D graphics capabilities of computers allows educators to bring the real world more efficiently into the classroom. Simulations on PLATO, for example, are used in the American Airlines and United Airlines flight training schools. Other examples of 2D projects involving use of videodisc are mentioned. (In fact, a list of groups working with computer controlled videodiscs is included on p. 90.)

One interesting aspect of simulation is intelligent CAI, on which the author is working at Wicat (ICAI is primarily text and is 'thinly' distinguishable from I-2D, which is primarily graphics.) In Campbell's research, models of student heuristic strategies are studied in order to "determine for what case it is important to know the student's bugs, and where it is sufficient to provide correction on the spot." (p. 88) The federal government is also involved in the development of sophisticated simulation, and "in the million dollar class", but for Armed Forces applications.

With enhanced capabilities of microcomputers and with the advent of videodisc technology, "computer hobbyists" may soon contribute to the widespread use of simulations. In fact, simulation authoring systems seem to be possible in the near future, and these "will be extended to modeling student states of knowledge and providing a tutor function. ... By inferring what the student does and does not know about the content, then adapting what is presented, the system can simulate a human tutor as well as the subject matter. This capability can be a breakthrough in learner productivity." (p. 90)

Dede, Christopher J. 1980. Educational Technology: The Next Ten Years. Instructional Innovator, March, Vol. 25 #3: 17-23.

At losses of 7% per year due to inflation, salary increases, and recession, education in ten years will have half the resources presently available to it. Education has reached the limit of what society is willing to allocate to it, and the limit to what it can produce given the existing system (cf Braun, 1980). Since education is labor intensive, as opposed to capital intensive, salary costs will increase over the long run more than machine costs would. Machines will cost half what they do now in ten years' time (at the current rate of 5% reduction per year), and will be thrice as productive as they are now. Therefore, they would be a good investment now, particularly as teachers will be demanding salaries that will rival the present day costs of machines.

What to do? "Take steps now to create a market for quality instructional technology." (p. 19) Five market areas cited are:

1. Learning through home TV.
2. Instructional computers/calculators/microprocessors -- The author envisions pocket calculator-like devices taking on many functions of instruction and socialization.
3. Home terminals for large computers -- These would accomodate "interactive, artificial intelligence based learning simulations." (One problem: IA requires 10,000 hrs. programming time per hour of instruction).
4. Videodiscs interfaced with personal computers.
5. Electronic communication and information processing -- Electronic mail, computer conferencing, computer search, etc.

What will be the ramifications of an infusion of technology into education? According to Dede:

1. Long term monetary savings; the emergence of school bond issues to finance hardware outlays and software development.
2. The role of teacher would take on new dimensions and necessitate specialized training. "In the long term, as many educational jobs may exist as do at present, but some will not be teaching roles and quite a few may be outside the school system, in industries, communities, and media. The final impact of technology on educational employment will not be so much to reduce as to alter roles and to shift employment to educational agents other than schools." (p. 21) Needless to say, these new roles will be more challenging than those at present.
3. "Inequalities in education would be reduced," but precautions would have to be taken against overstandardization and propaganda.
4. Subjects such as math might be taught by machine, while creative writing would continue to be taught by humanoids.
5. Having a good memory may become less important than having a working knowledge of where information can be readily accessed.
6. Centralization of curricula and finance will occur at the same time that decentralization of learning environment occurs. Interface with Ma Bell will become more important than a new roof on the school house.

To smooth the transition into the future, educators should:

1. Begin planning and focusing efforts now.
2. Organize nationally to lobby government and put pressure on the computer industry. 90% of the market will be software, and educators must learn discriminating tastes starting now.
3. Begin "devising anticipatory social inventions to regulate the use of instructional technologies; to reduce the negative effects they may produce ... " (p. 23)

The analogy with the introduction of printing is mentioned, and with monks copying by hand while presses whir.

Dodge, James W. 1980. Educational technology. In Thomas H. Geno (ed.), Our Profession: Present Status and Future Directions. Middlebury, Vt.: Northeast Conference on the Teaching of Foreign Languages, Inc.

For "rational implementation" of CAI and CMI, educators will need:

(1) knowledge of availability and applicability of equipment and materials,

(2) facilities for inservice training and for equipment maintenance and support,

(3) channels for exchange, which will hopefully lead to a means of standardization, and

(4) released time to produce materials, and recognition for materials produced "on a parallel with publication as a bona fide professional contribution." (p. 111)

There follows a concise (and useful) description of a typical authoring language, and a description, with mention of both advantages and limitations, of various kinds of computers. A couple of interesting points made in the section on personal computers are:

-- that "Foreign language CAI work with personal computers is poorly reported, but among those making an effort are linguists, computer programmers, classroom teachers of many languages (with possibly a majority of them being ESL teachers), and those who are intrigued by games." (p. 115)

-- that there is not nearly as much publication as there is experimentation with CAI using personal computers ("But we seldom choose to publish information concerning our failures.")

-- that work with microcomputers in CAI will remain behind closed doors for the time being, the disparate innovators working in isolation. As to the role of small computers in CAI: "over the next few years ... their use in contact with students seems unlikely on any large scale." (p. 116)

The final section, which is about time shared computers, gives a good overview of what systems are available. PLATO and other CYBER systems are discussed and contrasted. One project, SAIL at Stanford University, is to include earphones carrying computer synthesized speech.

Freeman, E. M. 1980. Reviews of Computer Assisted Learning in Science Education (by Beech) and Interactive Computer Graphics in Science Teaching (by McKenzie & Lewis). Programmed Learning and Educational Technology, February, Vol. 17 #1: 61-63.

Freeman has a few words to the wise concerning software in this review of these two books:

1. In-house development -- "It is always a source of surprise, if not painful shock, for beginners when they learn the true cost of software. Their initial enthusiasm invariably produces a plethora of small, limited, unsophisticated programs." (p. 62)

2. Adaptability -- "Everyone has his own ideas on the writing of software. It is only when someone else has to use the package that the snags appear. Students are particularly gifted in this field of activity (i.e. finding snags). It is vitally important that all software should be thoroughly tested by those intended eventually to use it." (p. 63)

3. Scouting the path -- "The reviewer cannot emphasize too strongly that the acquisition of experience involving small computers is invariably an expensive and frustrating business. If you can benefit from the experience of others, do so." But beware. Never presume complete compatability of borrowed or purchased software.

Frenzel, Lou. 1980. The Personal Computer -- Last Chance for CAI? Byte, July, Vol. 5: 86-96.

Although CAI "has never been extensively used nor has it lived up to its expectations" (p. 86), "education is rapidly emerging as one of the most important applications of microcomputers."

CAI was conceptualized in 1924 with Pressey's grading machine, and this concept was expanded and improved on by Skinner in the late 50's. Programmed Instruction texts were coming out, and some of these PI exercises were put onto computer. This step caught people's imaginations, but the great cost of computers thwarted development. Then PLATO came up with time sharing and developed "probably the most successful CAI project in existence".

Cons: "there is some doubt among educators whether CAI will ever become the ultimate teaching method. It is certainly not the panacea everyone expected." (p. 88) "it has never demonstrated any superiority over other teaching techniques," although "Its main value is as an effective technique for individual rather than group instruction."

"Secondly, most CAI is an extremely expensive and inefficient form of programmed instruction," as opposed to book format. Due to costs of computer and lesson formatting and development, "CAI may be the least efficient form of learning in terms of development time and cost." (p. 90) Video, the only medium that approaches CAI in cost, can more effectively present material, and video disk access replicates CAI, but is not limited to text.

Third, few people have the combination of skills necessary to produce good programs: one who knows the subject matter, knows PI techniques, and who knows a computer language well enough to put the lesson onto computer. However, "It is relatively easy to take subject matter experts and teach them concepts of programmed languages. But, this has not been done. One of the greatest needs and opportunities existing today is to develop materials that will teach individuals how to write learning programs."

What little work that has been accomplished has been done by individuals on "their own specific computers," and usually in isolation. No one (except possibly CONDUIT) has ever tried seriously to collate this material, although "It appears practical and realistic as a business opportunity." This situation has led to lack of standards and lack of compatibility. But: "The single greatest reason why computer-aided instruction has not succeeded in schools or in the home is the lack of "canned" or prepared courseware," and this has created a vacuum which instructors are not qualified to fill, and which precludes administrators from being willing to dabble in CAI.

Pros: CAI is an "interesting, exciting, and valid use of a computer," and people like finding things to do with computers, especially if they already own them. Computers are guaranteed learning experiences. CAI is not "study" per se. It is interactive and fully involves the student, making it hard not to learn.

Friel, Susan and Nancy Roberts, "Computer Literacy Bibliography", in Creative Computing, Sept. 1980.

This bibliography includes a section on resource material for education.

Fullerton, Judith G. 1980. Irregular German verbs. MICRO, (The Journal of the Society for Microcomputer Applications in Language and Literature) 1,2 (Jun):21-4.

This article describes a program enabling students to practice conjugating the irregular present tense German verbs 'sein', 'haben', 'werden', 'fahren', 'helfen', and 'sehen'. It includes a program listing coded in Applesoft Basic.

Hall, John. 1980. Adapt a microcomputer game for foreign language practice and practice programming like a pro. MICRO, (The Journal of the Society for Microcomputer Applications in Language and Literature) 1,1 (Mar):13-6.

"Fuga (Breakout) is an example of the many types of microcomputer games that can be adapted for instruction in foreign language skills. Reading would appear to be the most obvious skill that can be practiced, but foreign language phrases can be used to prompt dialogs or monologs for conversation practice, too." (p. 13) Accordingly, this article offers suggestions for adapting the public domain Apple II program Breakout into Fuga, a Spanish version with commentary in that language. Coded in Applesoft Basic, the listing printed here is incomplete, providing only information needed for adapting the larger program.

Hall, John W. 1980. Hangman: A game for vocabulary building on the microcomputer. MICRO, (The Journal of the Society for Microcomputer Applications in Language and Literature) 1,2 (Jun):25-8.

This article describes an implementation (in Spanish) of the game of Hangman, with the enhancement that words to be discovered appear in context in a sentence, and the sentences vary even with the same words. The program is listed; coded in Integer Basic for Apple II.

Hall, Wendell H. 1980. A cloze procedure program for testing reading comprehension. MICRO, (The Journal of the Society for Microcomputer Applications in Language and Literature) 1,2 (Jun):17-20.

This article describes a procedure for taking the program EL BUEN EJEMPLO, listed in MICRO 1,1 (Mar, 1980):22-4, and altering it using PLE (Program Line Editor) from C.A.L.L.-Apple so that it produces a cloze exercise. PLE operation is explained, and further enhancements to the program are suggested. The program, coded in Applesoft Basic, is listed here.

Hall, Wendell H. 1980. Microcomputer simulation and games for foreign language learning. MICRO, (The Journal of the Society for Microcomputer Applications in Language and Literature) 1,4 (Dec):8-11.

This article presents a rationale for using simulations and games implemented on microcomputer with young children, and for having the kids program the computers themselves.

Hallgren, Richard C. 1980. Interactive Control of a Videocassette Recorder with a Personal Computer. Byte, July, Vol. 5 #7: 116-134.

This is a largely technical article giving schematics, flow charts, and commands in Basic and Assembly language for Apple II and TRS-80 which will allow the microprocessors of both computers to control a videotape player. The videotapes referred to in this article are tapes of lectures, which the students can later review with CAI interaction having been inserted. (cf Bork 1980, who warns against using lectures with interactive video.)

Hitchens, Howard B. 1980. Survival in the Age of Technology. Instructional Innovator, September, Vol. 25 #6: 50.

This is a short editorial in an issue of Instructional Innovator devoted mainly to microcomputers in education. Its gyst is that there has always been a negative reaction to impending change brought about by breakthroughs in science and technology. Despite the reaction, change has always taken place. "Like it or not, you've lived to see the Technological Age. And to survive in it, you've got to learn to use its tools." (p. 3)

Huntington, John F. 1980. Microcomputers and University Teaching. Improving College and University Teaching, Vol. 28 #2: 75-77.

The brevity of this article compromises its information content, but there is an interesting comparison of BASIC with other CAI authoring languages. Advantages of using Basic are: savings in programming time, enhanced flexibility, and ready familiarity of programmers with the language. Disadvantages are difficulties in scoring and record keeping, limitations on I/O capabilities, and the ad nauseum aspect of logical sequencing. In its unextended version, Basic is "grossly inadequate for significant CAI development." (p. 77)

Hyman, Anthony. 1980. The Coming of the Chip. New English Library/Times Mirror.

This is one of the many books out lately giving some brief introduction to how computers work and what affect computers are having on our lives, both in the present and future. Included is a chapter on CAI. In Hyman's opinion, "in a wired society the best teachers could earn as much as film stars." (p. 112; see also Papert, in Byte, 1980.)

Jorstad, Helen L. 1980. New Approaches to the Assessment of Language Learning. In Thomas H. Geno (Ed.), Our Profession: Present Status and Future Directions. Middlebury, Vt.: Northeast Conference on the Teaching of Foreign Languages, Inc.

This is an impressive and timely article reviewing what is known about language assessment and how computer technology can help teachers put this knowledge into effect. CAI and CMI can help us take our knowledge of "the close conceptual and practical interrelationships among program goals, classroom objectives, class activities, and assessment," (p. 124) of item preparation, of standardization and validation, of statistical procedures, of "individual learning styles in the language learning process" (p. 132) and of affective variables in language learning and greatly improve the efficiency and output of our professional endeavors by utilizing this knowledge in conjunction with recently developed teaching hardware and software. (More about computers making teachers hone methodology in Kulik et al. 1980, Bork 1981, Howe 1981, Barger 1982)

That this is not being done on a large scale presently is because (1) software is lacking, (2) teachers do not know how to use computers, and (3) schools in general cannot relieve teachers of teaching loads so that they can learn about the new technology. The average teacher, in fact, does not "understand the benefits that access to large computers or minicomputers can provide in the language classroom." To remedy this situation, "every preservice teacher needs a background course in the use of computers for instruction, or at least personal experience working through the activites of a language program on a computer." Training programs need to be created, and "all types of interactive programs should be considered, including simulations, puzzles, contests, or games involving one, two, or more students simultaneously." (pp. 134-5) The 1990 scenario that concludes this article should whet the appetites of imaginative teachers and proponents of CAI/CMI everywhere.

Kulik, James A., Chen-Lin C. Kulik, and Peter A. Cohen. 1980. Effectiveness of computer-based college teaching: A meta-analysis of findings. Review of Educational Research 50, 4: 525-544.

This meta-analysis (that is, an analysis of various other analyses) is unique in that it concentrates on CAI at the college level. Previous reviews of studies on CAI, for example, Vinsonhaler and Bass (1972), Edwards et al. (1975), and Jamison, Suppes, and Wells (1974), all reported results favoring CAI, but at the elementary school level (see annotated listings of these surveys elsewhere in this bibliography). Where results have been reported for the college level, results have not been so consistent.

Kulik et al. therefore isolated 59 studies which met certain criterea, such as that they were controlled, and that they compared CAI to traditional instruction at the college level. They then catagorized these studies into those involving tutoring, computer-managed instruction, simulation, and having students program the computer. These catagories were further subdivided into those studies involving courseware which supplemented conventional teaching and those in which the software replaced conventional teaching, and again into courseware used throughout entire courses, and that used as isolated units. The results of this classification reveal areas where study is lacking. It was also hoped that it could be determined what configurations were most effective, but no correlations were found.

However, some positive findings resulted from the meta-analysis. For example, in achievement, "a clear majority of studies favored CBI." (p. 534) In addition, "There appears to be little doubt that students can be taught with computers in less time than with conventional methods of college teaching." (p. 537) Student attitudes also favored CBI, but only slightly. CBI was also slightly favored when correlated with aptitude-achievement; however there was no relation between CBI and course completion.

In discussing these results, Kulik et al. point out that there were some "unusually strong, positive" findings showing the influence of CBI on student attitudes, and isolated "dramatically" positive influences on exam performance. But the authors caution that "the accomplishments of computer-based instruction at the college level must still be considered modest." (p. 538) One interesting finding was however that "It seems possible that involvement of teachers in innovative approaches to instruction may have a general effect on the quality of their teaching. Outlining objectives, constructing lessons, and preparing evaluation materials (requirements in both computer-based and personalized instruction) may help teachers do a good job in their conventional teaching assignments." (p. 539; see also Jorstad 1980, Bork 1981, Howe 1981, Barger 1982)

Lockard, James. 1980. Computers Blossom at a Small School in Iowa. Instructional Innovator, September, Vol. 25 #6: 25,48.

This short article effusively relates the experiences of those at Buena Vista College who have been exposed to microcomputers in the teacher training program there. It seems that the college is turning out computer literates whose enthusiasm spreads to the places they find work, causing those institutions to break down and buy their own computers. Outside of the pitch that computer training is essential for modern teachers, the point is made that any anxiety students and staff may have had about the new machines was quickly dispelled, and that all concerned took to the computers like ducks to water.

Luehrmann, Arthur. 1980. Computer Illiteracy -- A National Crisis and a Solution for It. Byte, July, Vol. 5: 98-102.

Ignorance of computers "constitutes a major crisis," one that the educational system must help to resolve in two ways: direct computer training, and computer utilization in other courses. Computer awareness can be obtained from books, but computer literacy must be had from hands-on experience. Personal computers have an advantage over time shared ones in that they are not dependent on the proper functioning of a single main frame, although coordinating several micros presents logistical problems for the teacher.

Needed therefore, is a means of centralizing and synchronizing several microcomputers, curriculum development, in-service training of teachers in computer operation, and finally, public $upport for computer oriented reform (one hinderance is that parents see computers as penny arcade devices). Community awareness seems to be there, in this author's opinion (p. 102), because parents often work with computers, or because they are impressed that their children are "visibly excited" by computers when they work with them at school.

What can be done: The market force in the U.S. is 26,000 schools x 15 computers per school x $2500 per computer plus periferals and software, in addition to needed texts and manuals geared toward problem solving and not toward syntax of computer function. The size of this latent market must be used as leverage. Teachers must inform themselves of career opportunities in CBE, parents need to become more concerned, and government needs to provide funds to avoid leaving the disadvantaged out of the computer revolution.

Malone, T.W. 1980. What makes things fun to learn? A study of intrinsically motivating computer games. Technical Report No. CIS-7 (SSL-80-11). Palo Alto, CA: Xerox Palo Alto Research Center.

According to Perez & White (1984:39), this article formulates "broader explanations of motivational qualities based on research with arcade games."

Martellaro, Helena C. 1980. Why Don't They Adopt Us? Classroom Computers and Innovation Theory. Creative Computing, September: 104-105.

Educators are resistant to change: "Education today is much as it was one hundred years ago." Furthermore, "Because of their traditional attitudes and their weariness of innovations that claim phenomenal results, many teachers are just not certain how they feel about computers." They feel either that (1) computers are dehumanizing, (2) computers have potential but teachers are leery about having to deal with them in class, or (3) they want them now. Most teachers are in group (2).

Rodgers and Shoemaker's five attributes affecting the rate of adoption of innovations, and how these apply to the advent of computers in education, are cited:

1. Relative Advantage -- How much better is the innovation to that which it replaces? Computers are seen as nice, but not essential, teaching aids.

2. Complexity -- hinders adoption; and computers are pretty complex.

3. Trialability -- Schools purchase only what they can first see demonstrated, but computers require a huge outlay to either rent or buy just to try them out to see how they might fit into a particular program, and administrators balk at financing such expensive trial runs.

4. Observability -- Only teachers who are actually using computers can see how their students take to them.

5. Compatibility -- Computers are seen as threatening, dehumanizing, as one more toy in a series of new toys and gimics that have been highly touted but have proven to be passing fads, and as suitable only for the very bright.

In order to be accepted, computers will have to overcome these perceived obstacles to innovation.

McCabe, Jim. 1980. A School Computer, Yours for the Asking. Creative Computing, September: 48-53.

McCabe outlines steps by which he scrounged up castoff materials and built a personal computer for the use of his children's school.

Miller, Inabeth. 1980. The Micros are Coming. Media and Methods, April, Vol. 16 #8: 32-34, 72-74.

"The educational system ... is not moving fast enough to teach the skills necessary in this technological environment." (p. 34) Computer literacy will soon be a prerequisite for employment: "In few places other than schools is it even possible to secure an entry level position without minimal computer skills." Junior and senior high schools are now giving increasing computer exposure, with computer courses being part of the math curriculum in many places.

Courseware is not keeping up with developments in hardware. "Once again educators are faced with a situation where technology has raced ahead of available materials." (p. 72) Meanwhile, "Changing technology coupled with technological innocence presents one more mammoth stumbling block." (p. 74) The gyst is that computers are used by some without sophistication while others "blithely disdain the computer as they have ignored the entire video explosion and its effects upon student learning."

Educators must act now to rectify this, and while there is still time to have some mediating influence on and control over the new medium of instruction.

Milner, Stuart D. 1980. How to Make the Right Decisions About Microcomputers. Instructional Innovator, September, Vol. 25 #6: 12-19.

This is a good beginner's article. Computer terminology is explained, CBI is defined (as being a combination of CAI and CMI), and criteria for minimal computer literacy are put forward. CMI is more closely examined, and cost-effectiveness factors are explained. A comparison is made between various microcomputers on the market today, and finally nine "caveats" (warnings about expense and expectations) are listed.

Mundie, David. 1980. PILOT/P: Implementing a High Level Language in a Hurry. Byte, July, Vol. 5: 154-170.

This is a rather technical article on the creation of a preprocessor which will accept PILOT/P source code and translate it into Pascal source code, thereby making PILOT a more powerful and efficient authoring language for CAI.

Olsen, Solveig. 1980. Foreign Language Departments and Computer-Assisted Instruction: A Survey. The Modern Language Journal, Autumn, Vol. 64 #3: 341-349.

This article reports the results of a survey conducted to determine the current status of, attitudes toward, and problems in, CAI in foreign language instruction in the USA. Of 602 foreign language departments responding to Olsen's questionnaire, 62 had existing CAI implementations, 14 planned to introduce CAI, and 527 indicated no plans whatsoever for CAI.

Olsen first explores the reasons for so many institutions not having plans for CAI, and he finds that funding is a major factor. The departments in question seem to be on the low end of spending priorities, and university administrations coping with reduced state allocations find CAI to be an expensive innovation. Olsen finds this state of affairs to be a serious aggravation for departments who wish to be innovative, and a convenient excuse for those who wish to avoid the issue of CAI.

Some departments appear to have had unsatisfactory experiences with CAI and six departments had even abandoned CAI projects. The reason for this is as follows: "The consensus of all the colleagues with CAI experience is that an interested faculty member is instrumental for the surival and success of a computer program. But often the enthusiastic CAI supporters are untenured and mobile teachers, while those who stay are tenured and prefer traditional methods." (p. 343) In five of the six cases, the interested faculty member had left the department.

Still others have chosen to interpret inconclusive results of research reported on CAI as indicating the medium is not worth the investment of resources. To Olsen, this is one end of the spectrum of bias against computers, the other end of which might be characterized by the following remark: "computers can now teach computer language, not a living language". (p. 342) Indeed, comments from 42 departments expressed the belief that computers would replace people or that they would exert a dehumanizing influence on teaching. However, Olsen says "many of the negative comments are based on impressions, uninformed opinion, or even prejudice, while the remarks from the other group, the departments with CAI, are supported by firsthand experience and observation." (p. 342)

Since the former group may consist largely of older professors who control tenure in departments, their attitude may even preclude younger professors from devoting time to CAI at the expense of traditional research. Additionally, some departments are dubious of CAI because of observation of lack of success elsewhere, of the dearth of courseware, and of the inability of existing systems to handle the script and diacriticals necessary for FL instruction.

The remainder of the article is devoted to positive comments on CAI and to suggestions for implementations. It is suggested, for example, that developers "exploit the computer's powers of computation and branching capabilities and avoid simple drills that waste resources <and> emphasize the type of exercise that teaches students to generate syntactical patterns rather than merely to reproduce them." (p. 344) Interestingly, "little tedium is reported thanks to instant feed-back and rapid progress." (p. 344) There are of course pitfalls to avoid; for example, CAI demands time and resources. Also, "Programs coordinated with courses for which they are intended are most helpful, but also most costly and in need of frequent revision." (pp. 344-5) These also are hampered by short textbook life, but "this problem may be overcome in courses designed around the machine." (p. 345) In some cases (less than half reported here) "The computer's effectiveness in assisting self-paced learning has resulted in numerous programs completely independent of any course format or textbook." (p. 344)

Finally, "Almost all the departments using computer programs report some positive results. Most conspicuous is the attitude of the students." (p. 345) This aspect is often ignored by detractors of CAI. Despite the many problems with and strong resistance to computers in FL departments, "The trend is definitely toward an increased use of computers in a wide range of subjects, including languages." (p. 343)

Otto, Frank. 1980. Computer-Assisted Instruction (CAI) in Language Teaching and Learning. in Robert B. Kaplan, Randall L. Jones, and G. Richard Tucker (eds.), Annual Review of Applied Linguistics. Rowley, Mass.: Newbury House. pp. 58-69.

This is a "state of the art" article which defines, sets goals for, and outlines issues in CAI. Otto makes several points under very general headings, some of which are:

1. Observations -- CAI does not seek to replace teachers; rather, it is concerned with providing "speed, accuracy, and economy of instruction" (p. 58). It accomplishes these through immediate feedback and individualized branching. CAI "must provide encouragement while relieving feelings of tension." However, materials preparation time can be as much as 130-150 hours for each hour of student interaction.

2. Concerns -- Many teachers react negatively to the idea of CAI, probably because they perceive CAI as a threat (to job or to ego). Hence, these teachers need to be educated and informed on CAI; those trying CAI usually are favorably disposed toward it. So far, technology has far outpaced courseware sophistication, although voice hardware still needs to be developed. CAI costs, when considered over the life of the equipment, are "quite defensible".

3. Technological developments -- Formost is the promise of

videodisc interface. Graphics capabilities are constantly being improved upon, and when changes are suggested and made, "there is no waiting period for revisions."

4. Pedagogical developments -- The statement that "The notional/functional approach offers excellent potential for materials developers" is made but not supported.

5. Sociological developments -- Society is becoming keyed into the electronics age while lower costs and wider applications are making CAI attractive to school administrators.

6. Implications for further research -- Longitudinal studies are needed to see if aspects unique to CAI are really effective. Six aspects are mentioned in all.

Conclusions -- CAI can help improve the cognitive and affective quality of education. What is needed is for technology to intersect at some point with desired pedagogical principles "so that the two areas are mutually supportive." Following the article are annotated and unannotated bibliographies.

Papert, Seymour. 1980a. Mindstorms: Children, Computers, and Powerful Ideas. New York: Basic Books, Inc.

As it says on the cover, this book is "all about LOGO -- how it was invented and how it works." But it is actually about more than that; it is about how computers contribute to thinking and heuristics. Papert talks about "worlds" in which computers figure and in which children move more freely than adults. His approach is strongly based in Piaget, and his work has influenced many who are seeking to understand how software can be most appropriately configured so as to capitalize on that which is inherent in computers while not being bound by the restrictive paradigms in which educators have previously worked. (cf Scollon & Scollon 1982)

Papert, Seymour. 1980b. New Cultures from New Technologies. Byte, September, Vol. 5 #9: 230-240.

"Computers are the Proteus of machines: they take on many forms." (p. 232) In this article, Papert outlines his grand vision of a future in which children grow up using computers purposefully and naturally, like they now do pencils and pens. This vision is presented in several such analogies. For example, the fact that educators are using the computer now to "reinforce instead of displace the most ritualistic teaching methods," (p. 240) is analogous to the fact that filmmakers, unaware of what they could really do with the new medium, used to stage movies like they had plays. Thus, in Papert's vision, computers in education will not at all resemble today's CAI.

For one thing, every child would have access to a computer, and every child would be free to explore its possibilities in Piagetian fashion. Just as children learn language from being around others who speak that language, and from being able to accomplish things in that language, so would a child learn to communicate with computers. LOGO is in fact a language with which children can and do communicate with computers, a first step in a journey toward Papert's Mathland. Some children are already on that road; Papert mentions that some have overcome writing blocks with word processors, and a girl of four, tired of having to constantly call on an adult, typed out her first written words in order to get the computer to do something, leading Papert to conclude that "Children could learn to write as early and as easily as they learn to speak if the environment in which they lived gave as much support to the alphabetic language as ours does to the spoken language." (p. 240)

(Note: The bibliographer's three year old son can type RUN on the computer keyboard, hit 'RETURN', and then enter simple commands from a menu; see Scollon & Scollon 1982, for exploits of their four year old.)

Once computers become commonplace in people's homes, and once computer owning parents succeed in getting computers into their children's schools, then this "will encourage inventive and ambitious people to enter the field of educational innovation in unprecedented numbers." Mention is made of the "star" quality of this new breed of educator. (c.f. Hyman 1980) Carrying the analogy further, "The history of cinema has been the history of that culture. The future of computers in education will be indissociable from the story of the people who will make the computer culture."

Santoro, Ralph P. and Richard Pollack. 1980. Controlling for the Computer Video Environment: A Computer Augmented Video Education Experience. In ADCIS, Computer-Based Instruction: A New Decade -- (1980 Conference Proceedings): 45-50.

This is a description of how an authoring language (CSIS) and a video controller have been developed for a CAI lesson creation facility which is "simple enough to employ that even a neophyte computer user can create instructional material during his first session with the system." (p. 45) Experienced programmers have the further option of taking advantage of certain ancillary capabilities. The controller is centered around a 6502 (Apple type) processor. The authors feel that the weak link in the CAVE hardware configuration is currently the video cassette player, and they hope to replace it eventually with videodisc.

Scanlan, Richard T. 1980. Computer-Assisted Instruction in Latin. Foreign Language Annals, Vol. 13 #1: 53-55.

Latin on Plato was in its 7th year at this writing. Latin is a subset of over 2000 lessons in 100 teaching areas and 65 disciplines on Plato. The Latin lessons are described, and advantages of using Plato summarized at the end of the article. Studies of the program have revealed that in one semester in which a survey was made, those working on Plato were shown to have scored a grade level over a control group, and that throughout the program, study time on Plato was shown to be reduced by about a third.

Schwartz, Marc D. 1980. Integrating CAI & Videotape. Creative Computing 6, 9 (September): 116-117.

The gyst of this article is summed up, in the author's words, as: "A large number of teaching videotapes are already available. Using the method described in this article, the teaching value of those videotapes can be greatly enhanced with computer-assisted instruction by the relatively simple insertion of programmed teaching material at appropriate points on the tape." (p. 117)

Stevens, Vance. 1980. The CAL Facility at UPM. TEAM (Teachers of English Arabic Monthly), December, #37: 12-15.

Here is a description of how a team of five ESL instructors, all but one teaching half time and none with any previous computer training, learned IDF author language and produced 30 ESL lessons in one summer term for use at the English Language Institute at the University of Petroleum and Minerals in Dhahran, Saudi Arabia. The article also gives an explanation of how a CAI lesson is logically devised.

Stone, Deborah. 1980. Computers at an Alternate School. Creative Computing, September: 46-47.

This is a description of how kids at an alternative school, left alone with a computer, figured out how to use it. A couple of interesting points are made:

(1) Games gave the students "an immediate sense of the computer's approachability" (p. 47) and served as transition into the learning experience.

(2) The teachers knew nothing about the computer.

This article gives good insight into the kinds of doors that are opened just by having computers around.

Vazulik, Johannes W. 1980. The personal computer: An adjunct to FL instruction. MICRO, (The Journal of the Society for Microcomputer Applications in Language and Literature) 1,2 (Jun):13-6.

This article presents a drill and practice program for German. However, "To accomodate other grammar or vocabulary objectives, the FL instructor need only change the DATA entries and the identifying and explanatory information in the REMark and PRINT statements." (p. 16) A listing is provided, coded in Level II Basic for TRS-80.

Wells, Bethany J. and D. Scott Bell. 1980. A New Approach to Teaching Reading Comprehension: Using Cloze and Computer-Assisted Instruction. Educational Technology, March: 49-51.

This is a report on a project to improve the reading comprehension of Pueblo Indians deficient in reading skills using CAI in the form of computerized cloze passages. The students were allowed to proceed from one lesson to the other based on their combined abilities to replace words in the cloze and to score adequately on comprehension checks. The authors feel that the students learned strategies which enhanced their ability to make intelligent inferrences from context rather than reading line by line.

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Allen, Brockenbrough S. 1981. The Video-Computer Nexus: Towards an Agenda for Instructional Development. Journal of Educational Technology Systems, Vol. 10 #2: 81-99.

This article explores the direction of "videocomp" (video plus computer). Three domains are mentioned: home, hand-held, and network videocomp systems. The potential for both tape and disc videocomp are compared. Additionally, some limitations are noted; i.e. (1) the need for "programming unique to the medium", (2) the fact that present use is for individuals and small groups, (3) the fact that further use depends on lowered costs (which seem to be forthcoming), (4) the fact that "moving parts technology" needs to become solid state, (5) and the fact that as greatly enhanced memory capacity is developed (i.e. bubble memories) and its cost reduced, these need to be incorporated into videocomp.

Glimpses of the future are provocative: Tofler's idea of demassification can be applied to education; DeBloois' (1979) characterization of prerequisite restructuring of learning model assumptions are timely and interesting. Other arguments are brought to bear on such topics as digitalization of media production, complete "personalization" of film (hence, learning) playback, how technology is becoming competitive with teacher costs, how software development is the current "bottleneck" in the industry, how presently available courseware suffers from programmers being naive to the learning process, and how entertainment value must be played off against educational value in developing videocomp effectively.

Boettcher, Elaine G., Sylvia F. Alderson, and Michael S. Saccucci. 1981. A Comparison of the Effects of Computer-Assisted Instruction Versus Printed Instruction on Student Learning in the Cognitive Categories of Knowledge and Application. Journal of Computer-Based Instruction, August, Vol. 8 #1: 13-17.

This article reports research in which materials were prepared in two media, CAI and PI, and tested on students in an undergraduate nursing course. Unlike most other similar studies, Boettcher et al. paid particular attention to how subjects fared in two of Bloom's (1956) five cognitive categories: knowledge (recall of learned material) and application (the ability to use learned material in new, concrete situations). Another unique aspect of this study was that the materials tested were approximately the same, the PI texts containing essentially the same material as that programmed onto computer (PLATO). The study showed that the two modes of instruction were equally effective.

Working from the assumption that "some cognitive categories of learning may be more readily and successfully mastered through the use of CAI while other categories are more appropriate for other modes of instruction," the authors criticise the "general lack of delineation and discrimination among the cognitive categories in comparative studies of CAI and traditional modes of instruction ..." (p. 13) In their review of the literature, the authors found only one other study that explicitly identified levels of cognition in conjunction with a comparison of CAI and TI, and none where the lessons compared were equal in content and where only the modality of instruction varied. Noting that "Rockart and Morton (1975) state that there is a need for researchers to investigate what areas of the learning process are most appropriate for computer-assisted instruction," (pp. 13-14) the authors attempt here to augment research in just this area.

The authors feel that "controlling the content for the purposes of research" (p. 16) may have inhibited their making full use of the teaching capabilities of the computer, and that along with the limited scope of the study, this may have contributed to the inconclusiveness of their results. Nevertheless, they note several advantages of CAI over PI. For one thing, "forced mastery can be more readily introduced into computer-assisted instruction than into most other instructional methods," (p. 14) and this has been shown to be a significant factor in learning (see Jamison et al. 1974). Also, given rising costs in most aspects of education, CAI might be a means of cost containment. Finally, CAI can be more readily revised than can other means of instruction. Those contemplating use of CAI should consider these advantages, but mainly keep in mind that "it is how CAI is used rather than the fact that it is used that determines learning effectiveness." (p. 17)

Bork, Alfred. 1981. Educational Technology and the Future. Journal of Educational Technology Systems, Vol. 10 #1: 3-20.

Herein is a rationale for CAI and a prediction of interactive video being the educational medium of the future. The rationale is that: No one knows how people learn, but recent theories of learning seem to be compatible with developments in Artificial Intelligence, with the active learning made possible by CAI ("the computer is fundamentally an interactive device," p. 8), with a computer's ability to help students make up what is missing in their backgrounds, and with the notion that "Different media may be effective with different students." (p. 6; cf Jorstad 1980, Boettcher et al. 1981)

Meanwhile, Plato's idea of Socratic learning being the ideal method of education has lately been overwhelmed by the masses of students to be educated, leading to dissatisfaction with the present educational system. Thus a "force" is developing which will revolutionize the system, and whose "major driving force ... is the computer, particularly ... the personal computer." (p.8) Coupled with videodisc, great possibilities for education are inherent in the new medium, but only at the hands of qualified teachers, who have yet to appear to run the computers available to education. Therefore, much courseware is "imitative of other media;" CAI screens often resemble the pages of a book. Bork's group at Irvine has developed a systems approach to counter some of these problems.

Recent split brain research has bolstered the argument for visuals in educational media, but teachers appear to know little about employing graphical information in presentations. Thus, artists may need to be employed to help with courseware development. Videodiscs may ameliorate the visuals problem, but present videodisc costs are twice what they are with straight CAI, due in part to multiplied options being available with videodisc and in part to the cost of producing visuals.

Courseware producers may prefer videodisc to other forms of CAI because the read-only capability will give them software protection. Finally, several criteria for seriously considering using videodisc are given, as is a warning against using the new technology to present lectures, which are inherently non-interactive, and hence not suitable as subject matter for the new medium. (cf Hallgren 1980)

Burke, Michael A. 1981. Video Technology and Education: Genie in a Bottle or Pandora's Box? T.H.E. Journal (Technical Horizons in Education), September, Vol. 8 #5: 57-58.

This is an article on how educators can cope with the pervasiveness of T.V. in our society, and it ends with the suggestion that teachers inform themselves of recent developments in videodisc technology. Noting the advantages of videodisc such as rapid random access, massive storage capacity and subsequent application as an alternative to films, slides, microfiche, etc, and "complete" manipulation capabilities for both teacher and student, Burke says "It is premature, in my opinion, to invest too heavily in Computer Assisted Instruction Programs (CAI) when Computer Assisted Television Instruction (CATI) is just around the corner." (p. 58) The article includes a short list of other references on this subject.

Also in this issue, there are several reports of new courseware being marketed. For example, there is a series on basic English skills instruction being developed for Apple and Bell & Howell, the first of which is on reading comprehension with emphasis on inferential skills. (p. 12) On p. 18 there is a news item about Apple Computer and Southwestern Publishing joining forces to produce business and educational software. Other sources for courseware might also be found in the Reference Manual for the Instructional Use of Microcomputers (p. 33). Educational administrators might be interested in MicroPlanner, a curriculum management and administration system (p. 30). On the following page, you can read about an attendance reporting system for Apple II with 64K.

Burke, Robert L. 1981. Microcomputers in Education: A workshop sponsored by The Division of Instructional Development (DID) for the Assn. for Educational Communication and Technology (AECT), April 5, 6 & 18, 1981, Philadelphia, Pa.

This booklet has several handy references for educators desiring information on computers. For example, there are (a) a section listing of periodicals dealing with micros, (b) a short bibliography, and (c) several sections on various resource information for applications, hardware, and software.

Davis, Robert B. 1981. Computers; The New Industrial Revolution.

Saudi Gazette, March 28, #1510: 74-78.

Davis, a director at the Computer-Based Education Research Laboratory at the University of Illinois, writes about emerging computer expertise in young people. But he shifts emphasis in his article to the fact that, PLATO "May have the largest collection of computer lessons in the world, but it is nowhere near enough." Suggesting that the printing press is ready and waiting, but that books have yet to be written, he writes that "It would seem that a new industry is being born -- but few people are doing the creative work to design and author CAI lessons. It is as though we had TV with only blank screens."

Davison, Ned J. 1981. Have your students make study programs. MICRO, (The Journal of the Society for Microcomputer Applications in Language and Literature) 2,2 (Jun):12-18.

After a brief rationale for having simple drive programs available to students which the students can flesh out with content material they have been studying, the author presents a program for drilling 'ser' and 'estar' in Spanish by means of having students do translations. The program is one that stores paired associations in DATA statements; thus it could be applied to paired material other than translations. The program is listed and coded in Atari Basic.

Day, Richard. 1981. Review of The Micro Millenium by Christopher Evans. TESOL Quarterly, Vol. 15: 73-75.

Day reviews Christopher Evans' book (1979, cited elsewhere in this bibliography by its British title). This is a perspective on the computer revolution from the point of view of the then-chair of the ESL Department at the University of Hawaii.

Dixon, Rebecca. 1981. PLATO Reaches International Students with English Lessons. In Hart, Robert S. (Ed.), Studies in Language Learning: An Interdisciplinary Review of Language Acquisition, Language Pedagogy, Stylistics, and Language Planning; Special Issue on the PLATO System and Language Study, Vol. 3 #1, Spring. Urbana-Champaign: Language Learning Laboratory, U. of Illinois. pp. 98-112.

This article describes two streams of ESL lessons on PLATO developed at the Intensive English Institute at the University of Illinois and designed to go with Krohn's English Sentence Structure and Praninskas's Rapid Review of English. A rationale is given for designing lessons closely supplementary to what goes on in class, and for routing students through carefully designed curricula rather than allowing them to attempt to pace themselves.

Dixon points out that these lessons have been under development since the late 60's, and that they "have consequently made little use of the capabilites of the system which are now available." She also notes that the present drills "constrain the students rather than open

to them the communicative aspects of language development." However, new lessons are contemplated which would "couch the target grammar point in meaningful and creative exercises." (p. 106) Also mentioned are plans to expand especially the series that follows Krohn, and a "dream" of enhancing the existing reading, dictation, spelling, culture, and grammar lessons with audio response and input.

Dixon claims that there exist no valid measures of the effectiveness of these lessons and that limitations on such efforts fall in the areas of "research controls and constraints." The best measure, she says, is that students are "happy and usage is high so something must be right." Teachers of ESL, especially those with access to PLATO, would probably appreciate the insights in this article (and see also Marty, 1981, for a contrary opinion of how PLATO should be used).

Dove, Lewis. 1981. Computer Terminal or Microcomputer? A Difficult Choice for Small Departments. in Robert L. Burke (ed.), Microcomputers in Education: A workshop sponsored by the Division of Instructional Development for the Association for Educational Communication and Technology, April 1981, Philadelphia: 1-7.

The article begins with a summary of the many CMI and CAI applications at Western Illinois University. This is followed by an explanation (including prices) of the various hardware systems referred to above. The discussion covers both time sharing and independent microcomputer systems. It is concluded that a central computing facility is essential for large-scale data processing, but that microcomputers are adequate for most departmental needs. Microcomputers relieve mainframes of "simple computing tasks, releasing the latter for more challenging tasks. As their memory costs decline, microcomputers can be expected to play an increasingly greater role in small departments." (p. 7) (See also Dodge 1980, Bork 1981)

Hall, John. 1981. Some random thoughts on CALI programming. MICRO, (The Journal of the Society for Microcomputer Applications in Language and Literature) 2,2 (Jun):8-11.

This article offers several illustrations of the use of random number generators in varying program execution; i.e. in random selection of problems to be presented, in drawing from a database of congratulatory remarks, or in varying order of presentation of parts of an amusing story. The subroutines are coded in Integer Basic, which has easier implementations of random functions than in Applesoft (but corresponding codes in Applesoft Basic are also given). Although the article does not list complete programs, more elaborate settings can be easily visualized from the segments given.

Howe, J. A. 1981. Computers Can Teach Where Others Fail. T.H.E. Journal (Technical Horizons in Education), January, Vol. 8 #1: 44-45.

In support of his statement that "A small but growing body of evidence suggests that computer-based schemes may succeed where conventional teaching methods have failed," Howe cites examples from work with severely handicapped children. Of greater relevance to teachers in general is Howe's mention of the effects of programming on teaching. A computer "disciplines teachers in the sense that they have to produce both a precise description of a task and an effective procedure for executing it. In this case, the activity of programming serves as a metaphor for teaching ..." Furthermore, a teacher, in plotting a lesson on a computer, "is able to take advantage of the computer's capacity to handle complex teaching procedures which he or she could not cope with under group or class teaching conditions ..." (p. 44) Finally, the teacher is forced to deal constructively with his ideas about how learning takes place. (cf Jorstad 1980, Kulik et al. 1980, Bork 1981, Barger 1982)

Kadesch, R. R. 1980-81. Interactive Video Computer Learning in Physics. Journal of Educational Technology Systems, Vol. 9 #4: 291-301.

Much of this article is about how CAI might enhance the conceptualization of physical properties by science students, but the last section, on "Pedagogical Considerations" is of interest to educators in general. Two tenets govern work at the Univ. of Utah's Video Computer Learning Project, and these are: (1) "That a program of instruction should be highly interactive if more efficient and more effective learning is to be achieved ..." and (2) "That learning is enhanced by a Keller-type Personalized System of Instruction (PSI)."

The first tenet "is as yet insufficiently supported by research findings," whereas the second has been the subject of "extensive" and "quite conclusive" research. Of Keller's five elements in a PSI system, two were found to be unimportant (and perhaps detrimental). These were: (1) supplementation of CAI by one-on-one tutors, and (2) "self-pacing, as opposed to instructor imposed constraints on pacing." (all quotes so far, p. 300)

In conclusion, "It seems clear that stand-alone systems employing interactive video and computer graphics will emerge as the system of choice, particularly for the non-traditional student. The videodisc coupled to improved microcomputers can add to the learning situation powerful capabilities simply not present in traditional environments." (p.301)

Lewis, R. 1981. Education, Computers, and Micro-Electronics. T.H.E. Journal (Technical Horizons in Education), January, Vol. 8 #1: 47-49, 59.

In this article, Lewis tries to put the ramifications for education of recent developments in technology into perspective. First, he makes a distinction between the use of computers "as tools in education and their study as part of a comprehensive education." The latter has been neglected due to the lack of facilities and the inability of educators to put computing into the "broader context of technological and social change". Some of these changes since WWII are (1) "a shift away from the emphasis on factual knowledge towards a deeper understanding, and a belief that this can be best accomplished by increased student participation in learning," (2) education encompassing a broader spectrum of students, resulting in there being a wider range of interests and abilities in a given classroom, and (3) the fact that information is increasing at a rate greater than that at which humans can assimilate it, so that people may need to know more about where they can get information than about what that information is. (p. 47)

With this broader perspective in mind, Lewis mentions how CAI was used initially as an extension of programmed instruction and that its sole advantage was that it speeded up the process of PI. Hence, CAI "has not been a huge success. It has been resisted by teachers for a number of reasons: it implies a replacement of teachers ... it is said to 'depersonalise' instruction ... it depends upon an accurate model of the student's state of knowledge <and> upon a hierarchy of concept developments in the discipline which is not known outside the simplest topics; it has, up to now, been quite expensive ... it was running against the tide of opinion regarding didactic versus heuristic educational strategies."

But more recently, CAL (computer assisted learning as opposed to instruction) has capitalized more on "involving students ... in discovering things for themselves." Existing knowledge and ability of students, parameters chosen on educational grounds, high degree of teacher control over learning, and "the immediacy of response and reinforcement provided by interactive computing" all are important factors in the current viability of CAL relative to that of CAI.

Other uses of computers as instructional tools are guided tutorials ("Lying somewhere between CAI and CAL") and CMI, in which the teacher is relieved of certain managerial tasks which are in any case performed more efficiently and in finer increments by computers (although there still exist the problems of "maintenance of a suitable model of the learner and a hierarchical framework for the subject matter being taught.") Finally, there is the possibility of students more directly exploiting the heuristic nature of computing by writing programs to solve problems in the subject matter at hand. But due to the unsuitability of present programming languages, "the student spends far too little time on the problem itself and far too much on the coding." (p. 48)

The rapid proliferation of microcomputers in schools make these issues ones with which teachers will have to deal very soon; "it is only a short time ahead before the use of 16-bit processors, bubble-memory, plug-in software and video disks becomes commonplace ... teachers will be able to expect an educational resource as cheap and reliable as those they habitually depend upon."

The availability of hi-res graphics will provide great potential for more heuristic learning, but care must be taken that use of this medium does not "in fact reduce the onus placed on the student to think constructively." Other pitfalls are the possibility that, despite the computer's potential for challenging students imaginatively, "the majority of students are unable to benefit from such academic freedom". Also, we must not overlook the fact that computers will enable us to more easily do simple things. Finally, "it is not clear that the majority of teachers will not be more effective with less demanding resources like the overhead projector." If only the most innovative and dedicated teachers have until now become involved with CAI, then "if it becomes expected of all teachers that they use the new resources, either all teachers must become 'very dedicated' or the demands made on them must be reduced." (p. 49)

Malone, T.W. 1981. Toward a theory of intrinsically motivating instruction. Cognitive Science 4:333-369.

According to Perez & White (1984:39), this article formulates "broader explanations of motivational qualities based on research with arcade games."

Malone, Thomas W. 1981. What makes computer games fun? Byte 6,12 (Dec):258-77.

This is another, more accessible, discussion of intrinsically enjoyable learning by the author noted above.

Marty, Fernand. 1981. Reflections on the Use of Computers in Second-Language Acquisition. In Hart, Robert S. (Ed.), Studies in Language Learning: An Interdisciplinary Review of Language Acquisition, Language Pedagogy, Stylistics, and Language Planning; Special Issue on the PLATO System and Language Study, Vol. 3 #1, Spring. Urbana-Champaign: Language Learning Laboratory, U. of Illinois. pp. 25-53.

Although it is "obvious" that FL teachers cannot learn to become as versatile in the use computers as quickly as they can in the use of more traditional media, Marty chides the profession for not devoting more time and study to at least assessing whether computers could be put to good use in particular programs. He rejects the dehumanizing argument as being "flimsy" and then points to three consequences of continued "disdainful indifference" to computers in FL instruction. (1) Lack of recognition by academicians for work in CAI results in FL courseware being prepared by commercial programmers who are not qualified as language teachers, and whose wares will erode confidence in CAI as a medium of instruction. (2) Without active input from FL departments, institution-wide development of CAI will proceed without meeting the needs of FL instruction. Marty outlines these needs in terms of memory space, speed of operation, and analytical, graphic, peripheral, and editing capabilities of the computer. (3) Failure to enlist computers in FL instruction is an opportunity missed to attract students and to teach them optimally.

Marty then turns to "conditions under which the use of computers can help improve the study of foreign languages." (p. 28) In remarks that are well detailed without being technical, he addresses these conditions under the following six headings:

I. Will CAI reduce the number of language teachers? -- "The purpose of computerized instruction should be to provide the student with a tool designed to help him do his (home)work more effectively so that the teacher can devote a greater proportion of the class time to something which is beyond the capability of any present or future computer: the development of creative free expression. ... Thus, our purpose is to allow a better use of the teacher's talents, to make him even more valuable, not to replace him. By making our teaching more effective, we can attract more students and, indeed, create a need for more teachers." (p. 29)

II. How can the effectiveness of CAI be measured? -- Marty approaches this rhetorically: How can one measure, showing hard data, the effectiveness of a library? Like the library or the language lab, CAI should be available to students who feel they can study effectively using that medium. Students should never be compelled to use CAI because this would not be in keeping with the teacher's duty to train students to make their own decisions; and also studies done with such students may "'prove' that the method is ineffective." (p. 31) Marty also warns that, as was done with language labs in the sixties, we should "not again entangle a tool with a particular methodology." CAI, with its "high degree of individualization and feedback," can "Under appropriate conditions ... yield significant gains, but <there is> no reason to believe that -- by itself -- the use of such materials can be THE factor that will turn unmotivated students into motivated learners or that will compensate for a lack of intellectual ability and linguistic aptitude." Furthermore, "Any evaluation of computerized materials should take into account only what could not be done WITHOUT the computer ..." (p. 30).

III. Under what conditions will a student decide that CAI is valuable? -- There are physical and pedagogical considerations. Physically, students must have a comfortable and accessible workplace. Pedagogical considerations are that the student should be kept abreast of how much work remains in each lesson, and he should be able to leave at any time and return to his exact point of departure or to go on to another lesson. Marty emphasizes that the student should be able to make his own decisions regarding his use of CAI. As an illustration of some of the choices students could be given, Marty cites a lesson in which the student can either write in an answer for analysis by the computer or simply imagine one and compare this with the one the computer says is correct. The student can then tell the computer to either return the question to the exercise or remove it, making the computer operate as a sorter of flash cards. Of primary importance is that "The student should view the computer system as an ally ready to help him learn as efficiently as he can, not as a slave driver." (p. 33)

Marty also derides special effects feedback as "a waste of time." (p. 34) He prefers a simple 'no' as an initial incorrect answer response, and he shows how students can be given several options in getting more assistance as needed from the computer. "The assumption for providing the student with several levels of cues and analysis is that errors which the student discovers and corrects ON HIS OWN are less likely to recur than errors which occur in class ... or on homework assignments which are picked up by the teacher and returned later with corrections." (p. 38) It is also shown how students using Marty's materials can get information on their progress, even down to item analyses of mistakes they have made. Despite the availability of such data, "it is important not to use the computer system to give examinations"; among the reasons: "Giving examinations on the computer can change the students' attitudes from positive to negative." (p. 40)

IV. What gains can the student expect? -- From his experience with CAI, Marty says it is reasonable to conclude that "students who voluntarily use the computerized materials do so because they believe that they will get a better grade and/or save time. It would be useful to PROVE that those gains do actually take place, but at the present time it is practically impossible to compare two groups of students who would be perfectly matched and who would be working under identical conditions except for the fact that a group would be in a school where it would have VOLUNTARY access to computerized materials and the other would be in a school without such materials; I believe that this is the only kind of experiment which would be objective since forcing students to use a method of learning which they dislike affects their performance negatively." (p. 40)

Marty finds that some students intelligently use lessons designed according to the criteria described above, making gains in time and performance that "they could not have obtained ... without the computerized materials -- even if they had spent more time on non-computerized materials than they did on the computerized materials." Other students "achieve higher levels of concentration for longer periods of time;" whereas they would become distracted if forced to stay bent over textbooks. "It is also apparent that this higher level of concentration results in greater retention;" but it should be noted that Marty is speaking subjectively here. Given these facts about CAI, our society should reorder priorities so as to introduce computers into this area where they are vitally needed; otherwise, only the well-off will enjoy these benefits.

V. The FL teacher and computerized instruction -- Some words of advice: (1) Don't gear materials to a particular text. (2) When starting out, think in terms of just a few lessons. (3) Although CMI capabilities can be used to do item and error analyses and to study modes of presentation, Marty feels that these can be studied more fruitfully "live", in class. (4) It is more economical in the long run to hire the best programmer available to do the programming. It is possible to spend 100 hours on one program. The programmer should be hired contractually, since he is not always needed. Marty "would advise language teachers not to become involved in computerized instruction unless they can find the 50 or so hours that are necessary to acquire the needed basic training." (pp. 44-45)

VI. The future of CAI in L2 acquisition -- In this section, Marty offers suggestions for improvement of existing CAI on PLATO:

(1) Noting that strings are presently judged by comparing student input with lists of anticipated responses, and that "It does not seem possible to computerize a contrastive syntax which would automatically compare -- without any human intervention -- the student's answer with the correct answer ... and deliver an error analysis of the type we are delivering with our lists of errors" (p. 46), Marty suggests that analyzers be coded and that student replies be routed through a designated set of analyzers. This would catch more errors and reduce programming time.

(2) Some means must be found of apportioning the exact amount of cyclical review so that retention is achieved without any review being done needlessly. Marty suggests a "review coefficient" be set for each teaching point comprising such factors as ease of learning on original presentation and interval necessary for optimal review.

(3) Review exercises need to be developed apart from the original material. It would be nice if the computer could itself

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generate such material for students who scored below 75% on any exercise.

(4) It would save memory and programming time if self generating lessons could be programmed for basic grammar items.

(5) Computer languages need to be improved to accomodate special linguistic functions, such as separating roots from affixes.

(6) Despite great strides in computer technology, there are some areas that Marty sees as unpromising. a) "there is absolutely no basis for hoping that, at any time, we will be able to build a device which could understand native everyday conversation and respond to it." b) Although a student can use a computer to practice intonation, there is little hope for computerized help on the phonemic level. c) It is not likely that computers will be able to judge unrestricted written discourse, especially due to constraints on computer memory and on pragmatics of discourse (but see Evans 1980, who claims this to be one day possible).

(7) About equipment: a) Problems with compatibility must be resolved. b) School systems which buy equipment which is sure to become obsolete in effect subsidize future development and should be compensated. c) Plasma screens should be used in lieu of CRT's. d) Audio and visual capabilities should be joined to the computer. Slides, microfiche, and audio devices can be easily interfaced with computers. Videodiscs are expensive and complicated to produce, but Marty describes a disc alternative in use at the University of Illinois. Finally, there is a word about speech synthesizers and digitalizers.

Papert, Seymour. 1981. Society Will Balk, but the Future May Demand a Computer for Each Child. Electronic Education, September, Vol. 1 #1: 5-6, 31.

Papert encapsulates here some of the ideas he developed in more detail in his book, Mindstorms. He envisions each school child having his/her own computer the size of a paperback book, chargeable by cartridge or by telephone. It will talk and be interactive, and it will allow animation, music synthesis, access to larger data bases, and many other capabilities beyond our imagination today. Plus, it will be cheap. As Papert calculates it, even at today's prices, a computer for every child could be provided at 5% of present public outlays for education.

In his research, Papert discovered that children just three and four years old were able to manipulate a computer by typing on its keypad. He discusses here the possibility that writing may not be more difficult than speaking for children, and notes that of the two reasons (motor and social) that children don't write until much later than they learn to speak, the latter is the strongest constraint, and may be most succeptible to the impact of computers on future society. Presently, children have no need to communicate by writing, but Papert observes that the computer allowed the children in his study (1) to "produce exciting effects on the computer screen", (2) to achieve "an exhilarating sense of power and control over the machine", and finally, to have the satisfaction of mastering "what is perceived as an adult activity.

"It is easy to project a future where typing at a computer keyboard could open doors to vast worlds of unlimited interest to children. These could be worlds of games, of art forms, of access to libraries of video materials and of access to communication with people. Thus the principle social factor that makes writing more difficult to learn than speaking would disappear."

Two aspects of learning observed by Papert in his study of three and four year olds are that these children get clear notions of the constituents of language (ie. a concept of words and their exact spellings) that other children don't have even at the ages of five and six. Secondly, Papert believes his subjects developed an emotional attachment to the written language as an extension of oneself that many people never achieve in their entire lives as writers.

Schools in which a computer presence is most deeply felt may (if they don't become abolished) serve society more fully than before. In any case, computers will not be most effective in association with present day instructional practices (ie. as with CAI); rather, it will be possible to create more natural learning environments using computers, so that "Learning mathematics will be more like learning English in America or French in France than like the very difficult process of learning French in an American classroom." (p. 6)

Having made the point that there are no real economic reasons preventing there being a computer for every child in America's schools, Papert goes on to assess the reasons as being partly political, in that our society has no way to decide to place huge numbers of computers in schools, and partly psychological, insofar as people have preconceived notions of what 'school' and 'schooling' are. Papert concludes by warning that whatever nation makes the greatest commitment to computers in its curriculum will "sweep aside all competitors," and that "irrisistible pressures" will be raised "morally or violently" by the world's disadvantaged, once they see that computers are "a practical means to give their children access to knowledge and a sense of personal intellectual mastery." (p. 31)

Pritchard, William H., Jr. 1981. Introducing Instructional Computing into the Educational Environment. Electronic Education, September, Vol. 1 #1: 15, 21-24, 30.

It is remarkable that, in the midst of economic hard times, so many schools are considering investing in instructional computing systems. This may be because they recognize the lower long-term cost of computer systems, as compared to the current labor-intensive system, or perhaps it is due to the recognition that "instructional computing is an effective, efficient method for the delivery of learning systems and an innovation whose time has come." This article proposes a ten step model whereby instructional computing may be introduced into an educational system. The ten steps are:

(1) Recognition of need/desire to change -- Here, it is recommended that specific needs be isolated so that the "change agent" doesn't get bogged down in the endless possibilities for computer use right at the start.

(2) Initial soundings of opinion -- Attitudes of those within an institution holding power and those to be affected should be informally assessed. In this way support can be mustered, and opposition understood and dealt with.

(3) Formation of a support group -- Among the more obvious characteristics of the ideal support group is that at least one member should be computer literate, the better not to be left at the mercy of overambitious computer salespeople, according to the author.

(4) Research -- Research should focus on the goals in step one, and should include a study of available and appropriate hardware and software. Software is occasionally released untested, and should in any case be assessed as to compatibility with the hardware being considered. A cost analysis should include research into hidden costs, such as phone and maintenance charges, and costs to the institution in space and personnel should be included.

(5) Diffusion of information -- Four approaches to "change theory" are presented here. One could win skeptics over to one's point of view by presenting one's arguments as the product of either (a) rational planning, (b) forces of social interaction, (c) an aspect of human problem solving, or (d) a political ploy.

(6) Preliminary evaluation -- Now the ball is in the institution's court; it is the moneyed authority who evaluates the proposal as the change agent has presented it.

(7) Test prototype -- This step is self explanatory.

(8) Evaluation of the prototype -- Both empirical (educational goals, attitudes of all concerned) and ethnographic (effects of student-machine as opposed to student-teacher interaction) variables should be measured.

(9) Full implementation -- Attempts are now made to achieve the goals originally made in step one and further clarified in steps three and four.

(10) Maintenance and renewal -- Maintenance here refers to not only hardware, but to the instructional program itself. Renewal implies keeping abreast of developments, and might include ongoing in-service training of staff members.

Pusack, James P. 1981. Computer-assisted instruction in foreign language. Pipeline (Fall), p. 5.

Putnam (1983:40) says of this article: "Pusack gives the best short course I know of on how to use computers effectively for the different kinds of tasks the foreign language instructor faces. Those who fancy they would like to 'do a little software work' would do well first to study that paper carefully." Pusack, by the way, developed the authoring program DASHER.

Reitmann, Kearney. 1981. Adding Sight & Sound to Computer Assisted Instruction: Interactive Video. TESOL Newsletter, December, Vol. 15 #6: 32 & 35.

This is a short introductory article on interactive video with mention of applications to the ESL instructor, i.e. the ability to present and/or demonstrate objects and actions not normally found in class, to illustrate stories or sequences of actions, or to demonstrate use of libraries or of technical tools, all with the opportunity for student interaction (to name just a few applications). In conclusion, "Interactive video ... has great potential as a tool for English language teachers. In the future it may be possible to adapt computer games to language learning, to have students speak directly to their computer rather than use the keyboard, to have the computer check student pronunciation, or to provide students with access to library resources."

Roehrig, Joseph J. 1981. Computer scrabble. Byte 6,12 (Dec):320-51.

This game can be played by any number of players against the computer. The computer knows 725 two and three-letter 'words', not all of which are actually words. Versions of the program are listed in North Star and TRS-80 Basic; plus, the author offers soft copy.

Smeltzer, Dennis K. 1981. The Media Specialist and the Computer: An Analysis of a Profession's Attitude Towards a New Technology. T.H.E. Journal (Technical Horizons in Education), January, Vol. 8 #1: 50-53.

Classroom use of computers is increasing and will continue to reach proportions which will "rival other instructional technologies as the progenitor of new educational programs." However, the effectiveness of computers will be limited by that of the software run on them. Smeltzer predicts that commercial software will be used initially by teachers and that this will be found "not necessarily designed to meet the unique instructional needs of <the> classroom. Increasingly, teachers will demand individually designed computer programs." Computer specialists will be called upon to provide these programs. "The question is whether or not these programs will be educationally sound."

Smeltzer feels that media specialists, by virtue of their proximity to and expertise in areas of education where computers are needed as instructional devices, will logically be asked to provide these educationally sound materials. Hence he has conducted a survey (replicating two previous Creative Computing surveys designed to guage public attitudes towards computers) directed at media specialists and how they view their role as designers and managers of instructional computer systems. The bulk of this article reports on the results of that survey.

Stevens, Vance. 1981. What's an ESL Teacher Doing with a Computer? TEAM (Teachers of English Arabic Monthly), May, #39: 3-11.

This article describes some computer applications to teaching (beyond those mentioned in Stevens 1980) which were implemented by computer-naive ESL teachers in just one year at the University of Petroleum and Minerals in Dhahran, Saudi Arabia. Contained within is a call to educators to involve themselves as fully as possible in the computer revolution in order to help their students become computer literate, and to help influence the production of quality educational software materials.

Svenson, Raynold A. 1981. How to Determine the Strategic Potential of Computer-Based Instruction in Your Training/Education Department. T.H.E. Journal (Technical Horizons in Education), March, Vol. 8 #3: 36-38, 42.

Mr. Svenson, president of Management Consulting in Wheaton, Illinois, presents here a very comprehensive outline of how one would determine one's need for CBI, and then how one would research the implementation of an appropriate plan.

First, there is a discussion of criteria for opting for CBI in the first place. Next, steps in setting out the study procedure are detailed. Basic data gathering activities include a literature review, interviews with other CBI users, a review of available systems and costs, and a review of course development and training delivery administration. Once data are gathered, alternatives should be analyzed. These include deployment scenarios, checks of administrative and educational feasibility, and cost/benefit analysis. On the basis of the forgoing, recommendations can be made in the areas of system selection, and in deployment, staffing, administration, and financial/budget strategies. Finally, if the recommendations are accepted, an implementation plan should be drawn up.

Wyatt, David H. 1981. Using visual and sound effects to enhance nonprofessional CAI language programs. MICRO, (The Journal of the Society for Microcomputer Applications in Language and Literature) 2,1 (Mar):11-14.

"The program printout which accompanies this article is excerpted from a CAI tutorial on the sound and spelling of the plural noun form in English. The techniques can be adapted for use in any language lesson involving suffix addition and/or stem changes. They illustrate one method of reinforcing the explanation of such points with visual and sound effects." (p. 12) The listing is coded in Applesoft Basic.

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Ahl, David H. 1982. Through the Fog. Creative Computing, May, Vol 8 #5: 76-80.

Whereas this is essentially a report of products on display at the "Which Computer?" show in Birmingham, U.K., there is something here to compliment the article by Urrows & Urrows, 1982. "Britain has made a strong commitment to extend computer literacy to every person in the country. They feel, rightly so, that computers are the wave of the future and that every citizen ought to be able to take advantage of their potential. Thus, the government is supporting educational computer programs in schools by picking up 50 percent of the cost of the hardware as well as sponsoring a twice-weekly program on BBC television." (p. 76) Some of that hardware is described in this article.

Alesandrini, Kathryn Lutz. 1982. CAI Should Differ from Tradition.

Electronic Education, October, Vol. 2 #2: 15, 22-23.

This article stresses the fact that the best CAI programming should emphasize the unique aspects of the medium -- "the features of student control of graphics and concept-related visual feedback constitute the unique advantages of CAI over other media." (p. 22) The article discusses properties of effective graphics and, citing research that shows that recall of visual material exceeds recall of printed matter, Alesandrini gives nine rules of thumb for improving CAI via graphics. The nine suggestions are:

(1) Important concepts, either concrete or abstract, and main points in particular, should be presented graphically. In support of this, Alesandrini draws on her own research comparing two lessons in which identical material was presented both visually and verbally. The results were that "the graphic version was preferred over the all-verbal lesson and, more importantly, it resulted in better learning." (p. 22)

(2) "Supportive" or "arbitrary" symbols and graphs can be used to portray information that is difficult to convey realistically. Concept related graphics, such as international symbols for travellers, are another possibility.

(3) "Be sure to use appealing graphics in the opening display of a lesson to gain the student's attention," but not as mere decoration or motivation in the middle of the lesson. Graphics as rewards for correct answers are OK, but otherwise they "can be distracting or confusing and result in less learning than if no graphics were shown."

(4) Avoid overly complex graphics. It has been "found that extraneous detail in pictures can actually interfere with learning" by distracting students from information that might be more succinctly conveyed in a line drawing.

(5) "Give informative visual feedback after the student answers correctly." If concept-related feedback is not feasible, then decorative graphics will possibly do. Examples are given of each instance.

(6) "Give the student active control over visual displays". (All quotes to here, p. 22; all that follow, p. 23)

(7) Although no correlation has been found between colors and learning or memory, it has been established that colors and feelings correlate. From what is known, it seems that "reds and blues should be reserved for graphics that are not overly detailed while finely detailed visuals and text should be shown in white, bright yellow or green."

(8) Although "lengthy segments of animated graphics in a lesson can quickly become tedious and boring," judicious use of this device gets "highest ratings" from students.

(9) "When all else fails and information must be presented verbally, at least take advantage of visual cueing techniques." Examples of such techniques are special typefaces, centering and offsetting, imaginative spacial groupings, etc.

In summary, it is argued here that CAI should be designed around strategies which "are uniquely possible via CAI and take advantage of the computer's visual and interactive capabilities." Otherwise "the creative potential of CAI could be lost."

Barger, Robert Newton. 1982. The Computer as a Humanizing Influence in Education. T.H.E. Journal (Technical Horizons in Education), May, Vol. 9 #4: 95-6, 105.

Many who oppose the proliferation of computers in schools do so on the grounds that computers are somehow dehumanizing. Barger argues the opposite view, that "the computer can show people what it means to be human and can help them to become more human." He does this by discussing how computers can enhance ("especially in an educational context") the "fully human" traits of autonomy, individuality, rationality, affectiveness, responsiveness, and creativity.

Autonomy -- In 1982, one computer company alone (Commodore) will produce as many computers as had existed before 1981. As a result, the verb "know" has come to mean being able to access information, not necessarily to have it in one's head. Furthermore, CAI will be the major means of learning by the year 2000. Consequently, computers will not only enhance the ability of the individual to take more personal control over his own potential for development, but their eventual omnipresence will render "a facility in their use NECESSARY for human autonomy" (my emphasis).

Individuality -- Not only can the computer offer individual students the luxury of going at their own pace through course material, but students could choose between "a number of optional approaches to the same material." (quotes so far, p. 95) In addition, instruction can take place at the student's convenience, with few (or where the student has access to his own microcomputer, no) restrictions on time or place of instruction.

Rationality -- In some disciplines, students using computers can be expected to code steps of logical processes in machine readable format. Thus the computer can be a valuable teacher of heuristics and in any case, "a most efficient tool for helping students to sharpen their intellectual skills." (p. 96)

Affectiveness -- Through the use of engaging graphics as well as appeal to touch and sound, the computer has capabiilities for motivating and involving students unparallelled in other media of instruction.

Responsiveness -- In working through CAI, the student has to enter into a Platonic dialogue with a programmed instructional tool. Furthermore, in writing the dialogue, the teacher/programmer must take pains to see the lesson from the student's point of view and must think through not only right but possible wrong answers. When the student enters one of these incorrect answers, he is immediately corrected, whereas correct answers are immediately rewarded. In either case, appropriate action can be implemented based on the branching capabilities inherent in computer programming. Responsiveness also means that the student gets information meted out to him as he is ready for it. Finally, simulations can be performed on computer which obviate the possibility of costly mistakes in real life.

Creativity -- Computers allow many options and possibilities for both students and teacher/programmers. "Also, the computer indirectly encourages creativity by taking care of 'drudge' work," freeing academicians to engage in more creative teaching and thinking. (p. 96)

Blankenship, John. 1982. Give Your Apple a Voice: A Speech Development System Using the Radio Shack Speech Synthesizer. Byte, May, Vol. 7 #5: 446-456.

As indicated in the title, this is a description of a Radio Shack device which synthesizes human speech using an inventory of phonemes, and of how that device can be modified for use with an Apple. Also, a program is listed which purports to affect a simple synthesis. Some strictly phonological considerations pertaining to realistic synthesis of spoken English are touched on. Also included is a description and illustration of a low-res face accompanying the author's program whose lips and eyes move in sync with the sounds being synthesized.

Blizek, John. 1982. The First National Kidisc -- TV Becomes a Plaything. Creative Computing, January, Vol. 8 #1: 106-110.

The Kidisc was created to exploit every imaginable feature of videodisc technology. Its creators pass on some points which they learned in producing the Kidisc which may help with interactive videodisc production in general.

Bork, Alfred. 1982. Reactions. In Lawler, Joseph (Ed.). Computers in composition instruction. Los Alamitos, CA: SWRL Educational Research and Development. pp. 67-73.

For Alfred Bork, this is a "light" article, but this does not detract from the lucidity with which Bork elucidates crucial issues in CAI development. Noting that "the computer is a gift of fire," with both good uses and bad, Bork points out that "it is not clear that the computer is going to improve education. The computer, like any new technology, has the potential for improving education or weakening educaton. Everything in human technology has this dual potential." (p. 73) In this article, Bork tries to illuminate ways by which the computer can be used to strengthen education.

(1) Screen Design: Presentation of text on the screen should not emulate print, a medium with a wholly different set of constraints from those found on computers. Developers should keep in mind that "blank space is free", that "short lines aid readability", that text need not be placed always at the left margin, that "there is no reason that we can't display text logically, keeping natural phrases together on a line", and that we should "allow users to set the rate of the text display." (p. 68). (2) Timing: Developers must be sensitized to how users will react if the program halts, or if it proceeds after a preset amount of time. (3) Content: Content should not be trivial, and help routines should be "just as interactive as the rest of the material." (p. 69) (4) Medium: Visual material, and much more interaction, should be used to counteract the verbal orientation of present courseware. Also, other media (e.g. student handbooks and teacher's guides) should not be used to compensate for design flaws. (5) General Issues: "We ought to use English as the medium of communication" (p. 70) rather than Y/N or multiple choice ("a tactic of desperation in dealing with large numbers of students"; p. 70).

In developing materials, we need to "begin to arrive at measures of interaction ... and talk about the quality." Also, we can now truly "individualize the learning experience. We can make the learning experience different for different people." Finally, we can consider "new ways to organize learning," a concept difficult for conventional teachers to grasp. (p. 71)

Development should not be left to the spare time of the teacher; rather, it should proceed on the scale of development at the Open University in England, where a million dollars might be put into a course that will be scrapped after seven years. Also, "Instructional designers ought to stop thinking about programming," (p. 72) an area which must be left to specialists in order to achieve commercial-quality results. Additionally, materials should be considered only after having first established a base of research; rather than asking what we can do with computers, we should ask what pedagogical problems need solution. Furthermore, we should look to the future; for example, not "develop materials for the kind of hardware that is currently available," and which will soon become obsolete. (p. 73; cf Hofstetter, 1983) Moreover, we need to "think more about non-school environments" for our courseware. Finally, we need to "think about the computer as a 'combining' device" (p. 73) that will address several skills at once (e.g. reading and writing together; not writing separately).

"We are at the threshold of a real revolution in the way people learn -- a revolution that is going to influence our entire educational system." (p. 72) However, we are introducing fire into our schools. Consideration of Bork's points may help determine whether or not this fire is used beneficially.

Burnett, J. Dale and Larry A. Miller. 1982. Small Scale CAI: Some General Considerations and an Example from Reading Education. Journal of Educational Technology Systems, Vol. 10 #3, 1981-82: 207-222.

Lately, the trend in educational computing systems has shifted away from dependence on large mainframes to work with stand alone systems. Consequently, "It is now possible for virtually any interested institution, or individual, to begin developing and using computer-based instructional materials ..." (p. 208) As a result of this development, the following project was possible.

This article discusses a series of lessons developed in BASIC on an IBM 5100 teaching student teachers principles of the reading process. For comparison, two other CAI reading projects are mentioned, both of which "appear to suffer from an inadequate model of the reading process ..." and from the fact that they were "designed to fit the capabilities of the computer." (p. 214) In contrast, the authors were "only interested in the technology to the extent that it is capable of doing what we desire within an instructional framework." (p. 209) Furthermore, their lessons were developed based on what the authors feel was a sound psycholinguistic model of the reading process.

The authors' lessons were designed so that student teachers would draw conclusions about the reading process from their experiences with the computer. The exercises teach constraints on context, syntax, semantics, and orthography. In one exercise, students fill in a blank in a sentence with twelve possible words. Then other sentences are given with blanks in which an ever decreasing number of the original twelve words will fit. Finally, all but one of the original words is eliminated. Another exercise displays a series of sentences in which the students are required to replace nonsense words with English words. As more sentences are displayed introducing additional constraints on the nonsense vocabulary, students can change their minds about the words in preceding sentences, so that by the end of the exercise, the meaning of all the nonsense words is clear. A final exercise has students guess every next letter, one by one, in mystery sentences stored on the computer. After working these lessons, the students discuss in class what they have learned about prediction in reading.

The programs were developed in three stages. First, exercises were conceptualized without consideration for programming limitations. Next, the exercises were modified for the computer, the major constraint at this stage being the size of the text window. Finally, the program code was altered to improve machine speed. The authors feel that the resulting exercises were "unique in that no factual information is presented to the student; he discovers the answers as more and more written language is presented." Secondly, metalanguage is totally dispensed with. But in the authors' view, "the main feature of this project lies in the adaptation of a viable model of the reading process to a computer assisted instructional format." (p. 218)

Burns, Hugh. 1982. Computer-assisted prewriting activities: Harmonics for invention. In Lawler, Joseph (Ed.). Computers in composition instruction. Los Alamitos, CA: SWRL Educational Research and Development. pp. 19-29.

Using metaphors from harmonics and music, and characterizing "invention as electronic orchestration," Burns elaborates on the theory behind his milestone programming (reported elsewhere in this bibliography: Burns and Culp, 1980). Interestingly, he calculates that, were he to teach until the year 2011 classes of 140 students who must each write 8 essays, then he would have to come up with 32,480 different topics for them. With his program, of course, he will be spared much of this tedium. More important, students may be led to "say to themselves, 'Wait a minute, I can ask myself such questions.'" (p. 22) As an example of the interaction involved, the transcript of a student stumbling around the topic of "Entropy in Maxwell's Demon" (from Pynchon's The Crying of Lot 49) makes for entertaining reading.

Burns also summarizes the most interesting results from his research (Burns and Culp, 1980) into the effectiveness of his programming. First, although students using his program were able to generate more ideas than were those in the experimental group, they had difficulty with the preponderance of ideas; "too many ideas made the arranging task difficult and time consuming." However, Burns and Culp "verified that invention doesn't end. Several students told us on the follow-up questionnaire that the best answers to the questions did not occur to them while they were on-line. They were stimulated to think about their subjects from new points of view. That's exciting." (p. 28)

Collett, John. 1982. A Tenses Computer Program for Students of French. The Modern Language Journal, Summer, Vol. 66 #2: 170-179.

This is a thorough, though not highly technical, description of how lessons were developed using Basic to enable students to drill verb tenses in French. At first, the lesson authors worked using a multiple choice format, but this article describes some of the difficulties and considerations in going over to a write-in format. Some attention was paid in the programming to compacting recursive elements to such an extent that the number of separate programs needed to run the original lesson was reduced from forty to a single program accessing 80 data files, with corresponding gains in "elegance, efficiency, and programmer satisfaction." (p.172) The data in the files (verb stems, tense endings, and the like) are called at random, enabling the formation of some 20,000 possible sentences in French. However, some of these sentences being improbable in French, certain combinations are flagged so that if they happen to occur, the computer is instructed to forsake them for a new combination.

The article mentions some problems with the program which are peculiar to French, and some, such as "a certain lack of variety," (p. 178) which are peculiar to Basic. Still, authors of CAI will be impressed by the attention to proper programming style, and with possible adaptations of the programming ideas here to their own work. Additionally, although it is not specifically mentioned here, the article provides an example of how linguistic and programming considerations in analysis of language might in some ways coincide.

Davison, Ned J. 1982. Verse weaving: A challenge for all ages. Creative Computing 8,7 (Jul):166-72.

"Randomly selecting lines of verse from a set of data statements, the program displays a poem on the screen." (p. 168). To use the program, users should pick a theme, then input lines replete with places, characters, actions, times, adjectives, details, etc. The result is poetry whose "variety and impermanence offer a new kind of verse, fiction, or dialog that is constantly changing and elusive" (p. 168); "What happens is that you gradually uncover your own feelings about the subject or theme" (p. 168). The program is listed, coded in Atari Basic. (See also Davison's article in MICRO 1,2:3-12, June 1980.)

Durkee, David. 1982. Maple Sugar and Apples: A Yummy Way to Learn. Softalk, April, Vol. 2 #8: 170-174.

Noting that initial enthusiasm for CAI waned once the novelty had worn off, it is asserted in this article that "Since the advent of the microcomputer there has been a second wave of research in CAI." (p. 170) The research dealt with here is the work of Bernard Fox and Mary Wilson of the University of Vermont, who first designed a study to determine "whether young children would even interact with the computer." The result was that "all but one of the children participating in the test preferred the computer test over the flash card version." (pp. 171-2)

Next is described a program in which students of varying backgrounds were taught the history and techniques of CAI. Armed with an enviable array of Apples and periferals (i.e. modems, graphics tablets, voice synthesizers and digitalizers), students produced such input devices as touch sensitive overlays, joysticks, and even distance sensors allowing head movements as input. Other work was done on improving student writing using Apple Writer, and constructing databases of words with Echo II and allowing access to those words with as few keystrokes as possible.

Another project involves use of a hi-res animated talking Blob whose function is to "train students in prepositions, pronouns, who and what questions, verb tenses, and more ... The program makes full use of the Apple's 48K of memory to minimize disk loading time ... because students lose interest when they are kept waiting." Plans are to convert the Blob's speech from digitalized to memory conserving synthesized speech, but reservations center around the fact that "no studies have been done to show the effects of a computer accent on a developing child."

Fox and Wilson say that "Today neither technology nor the cost of technology stand in the way of developing creative courseware that makes learning language as exciting as any arcade computer game of Space Invaders. Only our mind's imagination limits us." Still another limitation is mentioned in the article; namely, the shortage of trained courseware developers. In Vermont, at least, there appear to be "more microcomputers available for special education than <there are> special educators trained to use them." (p. 174)

Fitzgerald, Brian. 1982. The amazing maze in 3-D. Softline 2,1 (Sep):10-4,26.

This article, first of a 5-part series, shows how to plot a 3 dimensional maze. If the maze were, say, the corridors of an educational institution, or of a hospital, or what have you, and objects in the maze registration cards or pharmaceutical items, etc., then imagine the impact on language learning a program based in this setting would have! A listing in Applesoft Basic accompanies the article.

Fitzgerald, Brian. 1982. The amazing maze, Part II. Softline 2,2 (Nov):24-8.

This article, part of a five-part series continued into 1983, shows how to plot and color in the maze in question. A listing in Applesoft Basic is provided.

Glenn, Patricia D. It's Academic. 1982. Creative Computing, October, Vol. 8 #10: 38-48.

This is an article about a commercial program called Mentor Master, which sells for under $40 and enables the owner of a 48K Apple

II+ to create simple CAI materials. Although the author of this review is careful to point out that Mentor is a programmed template, "not a CAI authoring language" (p. 38) and that its capabilities are severely restricted, she does note that it is completely menu driven, incorporates a word processor for text creation and editing, and provides full documention on the screen; in other words, it is designed to be used by anyone who can turn on a computer and then follow directions. Glenn warns, however, that proper advance planning is necessary in making "worthwhile" lessons, otherwise "the result is worse than useless." (p. 42)

Noting that Mentor can produce little more than "electronic page turner" tutorials, Glenn nevertheless feels that Mentor has a place within the educational establishment. "If tutorials and drill and practice programs are a means for increasing the acceptance of computers in the schools, then they should be used." (p. 44; see also Merrill,1982)

Herriott, John. CAI: A Philosophy of Education -- and a System to Match. 1982. Creative Computing, April, Vol. 8 #4: 80-86.

According to Herriott, "There is a very strong possibility that before the end of this century, students will be receiving all of their instruction from computers, with no contact with teachers whatsoever." Thus, "Unless very serious thought is given to the whole question of the role of the computer as a teaching device together with a re-vamping of the entire system to allow full use of a powerful tool in education, I'll wager that there will be rampant anarchy with empty schools and out of work teachers." (p. 80) Fortunately, Herriott further speculates that readers of Creative Computing (and by extension, of this bibliography) will not be among the unemployed.

However, in considering change in educational systems to allow for enhanced utilization of computers, one should NOT "try to see how the new device fits into existing patterns." On the contrary, one should consider its implementation in systems whose characteristics might include the following: "First, the classroom as the most common teaching mode, will disappear." Second, good teachers will be able to multiply fruitful contact hours with their students, possibly taking on roles as councellors and guides. Third, students will have more control over their direction in a course, even to the point of deciding when to leave it. In the wired 'classroom', "There is no timetable." The students' control might extend to their being encouraged to write CAI lessons themselves. (cf Lewis 81)

In making use of computers in education, one should strive to utilize the seven advantages of CAI; namely, the ability of computers to (1) teach on a one to one basis with a high success rate, (2) provide imbedded remedial instruction, often unbeknownst to students, (3) provide "enrichment material", (4) track student progress, (5) allow for self pacing, (6) provide video and audio support through periferal devices, and (7) provide access to massive information retrieval bases. But however computers are utilized, one should keep in mind that it is imperative that the interactive nature of the medium be emphasized. Letting the computer take too much control, even of turning on and off periferals, can have a lulling effect that might work to the detriment of other benefits inherent in the medium.

Hitchcock, John. 1982. AWACS. Creative Computing 8,5 (May):158-67.

The player is in an AWAC plane, from which he controls an air battle, attempting to destroy or to have destroyed enemy planes before they attack his bases. The player has a hi-res radar screen, and can scramble aircraft and direct their fire. The program is listed with coding in Applesoft Basic.

Johnston, Emily G. 1982. Double Cross. Creative Computing 8,10 (Oct):252-8.

A double-crosstic is a puzzle that derives from a quote, its author, and the published source. The author and source are written vertically so that each letter begins a horizontal word or phrase, all of which the player must discern from definitions or hints regarding the horizontal words. Correctly figuring out the hidden phrases reveals the author's name and source, and, through cross reference with a diagram, the quote itself. This program limits quote length to 256 characters. The program is "written in DEC PDP-11 Basic Plus and is heavily dependent on the string manipulation features of that language." (p. 252). The article lists a sample run only, but the program listing (or mag tape soft copy) is available from the author.

Kehrberg, Kent T. and Richard A. Pollack. 1982. Videodiscs in the Classroom: An Interactive Economics Course. Creative Computing, January, Vol. 8 #1: 98-102.

Economics was chosen for development of interactive courseware in this project because economics happens to be a course which is occasionally subject to cancellation for lack of students, given today's economic exigencies. Otherwise there is much in this report of general interest; in particular, problems of lesson development, which are global in nature.

For example, it is useful to know that the lessons in question were all laid out on paper before the decision to enhance one part or another with video was made. Then, a service called Encyclovideo was enlisted to locate the appropriate films from Encyclopedia Britannica. Actual production was done in three stages: premastering (on video tape), mastering, and replication, and costs for these steps for one tape exceeded $6000. Furthermore, these costs were "not the expensive component in computer and videodisc courseware development. The major expenses lie in the development of the courseware with its computer and video material." (p. 102) Still, it was thought that the advantages of videodisc over the less expensively produced video tape counter-balanced the additional cost of video production.

Kellner, Charlie. 1982. V is for Videodisc: Using a Videodisc with Apple SuperPilot. Creative Computing, January, Vol. 8 #1: 104-105.

SuperPilot differs from standard Pilot in that it has 27 colors, better animations, and faster printer control and student record capabilities. It also allows a V: command which will, given the correct interface card and Pascal control program, control a videodisc. These capabilities are briefly touched on in this short article.

Kimmel, Stephen. 1982. I Sing the Editor Electric. Creative Computing, June, Vol. 8 # 6: 75-78.

This is a review of a bit of commercial word processing software called Grammatik, which searches through a file of text for any of 500 words and phrases (stored in the Grammatik program) commonly misused in English. On encountering one of these, the program prints out a message prompting the user to double check his usage of that word or phrase.

Assuming that a group of learners were able to write compositions using word processors, Grammatik could be used to assist them in double checking their work for their most common mistakes; for in addition to the original 500 words and phrases in Grammatik's internal dictionary (which may or may not be appropriate to students of ESL), 300 other words and phrases may be supplied by the instructor or user. Then, according to the reviewer, Grammatik "is like having an English teacher available to you all the time. Running it on a regular basis would improve your writing skills." (p. 76)

The major limitations of this particular software are that the program operates independently of the meaning of words, and that the program cannot check for grammatical errors. The program can only search out the words and phrases previously keyed into it, leaving it to the user to judge whether that word or phrase is indeed misused or not. However, these limitations, if looked upon as the next hurdle to overcome, suggest the eventual development of a computerized error monitor for language learners.

Lathrop, Ann. 1982. Courseware selection. In Lawler, Joseph (Ed.). Computers in composition instruction. Los Alamitos, CA: SWRL Educational Research and Development. pp. 47-60.

This is a better than average article on software evaluation, because not only is it a primer on the subject for the prospective user, but it contains a lot of reference information for the experienced user. For example, the article incorporates an annotated bibliography on articles dealing with software evaluation as well as a listing of names and addresses of periodicals carrying reviews. Additionally, two instruments for evaluation, one recommended as being carefully developed but easy to use, and the other as being comprehensive and detailed, are cited.

Among the many suggestions made concerning evaluation: obtain appropriate instruments for evaluation, consult software reviews, and favor distributors who allow 30-day approval. Consider whether the software meets a curriculum need and whether it constitutes a valid use of the computer. Try running the program as a good student (to see if it is fun, valuable, and challenging), as a poor student (to see what kind of feedback and guidance it gives), and as a negative student (to see if you can bomb it). Observe and poll students to assess their reactions. Finally, help influence the marketplace by refusing to buy anything but high quality courseware.

Lawler, Joseph. 1982. Appendix: Evaluating textual responses. In Lawler, Joseph (Ed.). Computers in composition instruction. Los Alamitos, CA: SWRL Educational Research and Development. pp. 75-81.

Lawler reports on work at SWRL whose purpose was to investigate the potential for microcomputers in writing instruction. An examination of the literature showed that the field was "limited" in that not much courseware required student input of more than a character at a time. Lawler and his colleagues therefore decided to focus "on designing computer-based materials that would require the actual production of text. And we also felt that our programs should be able to evaluate that text." (p. 76) It was further decided to teach sentence combining, since this had been shown to be effective, since the "sequence and scope" of such a program was fairly straightforward, and since the range of possible responses produced by students would be limited and relatively manageable. However, it was not easy to design a program that would parse strings in such a way that the program would distinguish totally wrong answers from those that had only spelling or punctuation errors.

Design of the parser followed several steps. First errors were classified as either syntactic (and treated by routing through some remedial feedback in the program) or form errors. These latter were routed through the parser. The parser first checks for a capital letter at the beginning of the sentence and for a period at the end; if one of these is missing, the student is so informed. The parser then checks for the sentence combining "signal"; if none is found, the student is asked to add one or is passed into the appropriate syntactic error subroutines. Next, the parser compares the number of words in the student response to the number of words in the correct answer; if there is a discrepancy, the student is asked to rectify it or is passed into the remedial portion.

Checks for initial capital, final period, sentence combining "signal", and correct number of words were trivial compared to the complex subroutines necessary for checking spelling. The initial step was to define misspelling. Eventually, subroutines were written that would detect when one word had one letter more or less than another, one letter different from another, or two letters transposed. If such a word was encountered, all else being equal, the program could still save the student from getting bogged down in the remedial part of the program. (See Soemarmo, 1983, for examples of such routines.)

In conclusion, Lawler reiterates that programs of this nature are very difficult to write and will not likely do exactly what they are meant to do. However, the effort is worthwhile in the long run, since students are appreciative of the fact that they don't have to retype whole sentences because of typographical errors, and this helps students to "view the computer as a partner rather than an adversary." (p. 81) Also, although Lawler doesn't mention this, this kind of programming, once developed, can usually be used intact as subroutines in subsequent lessons.

Lawler, Joseph. 1982. Computers in Composition Instruction. Los Alamitos, CA: SWRL Educational Research and Development.

This book is a collection of papers from a recent SWRL (Southwest Regional Laboratory for Educational Research and Development) conference whose participants explored how recent developments in writing instruction (e.g. concentration on process over product) could be enhanced through the use of computers. All of these are cited in this bibliography; still, to quote from the introduction:

"The first paper in the volume provides an overview of the current state of computer-based composition instruction. Robert Shostak discusses the problems that writing teachers have traditionally faced and describes some <specific software> that may help overcome these problems.

"Hugh Burns describes a computer-based dialog that he developed to assist students in generating ideas for writing." (cf Burns & Culp, 1980) "Earl Woodruff discusses the role that computers can play in helping students compose text. Ann Lathrop outlines criteria that should be considered when selecting courseware for purchase.

"The courseware demonstrated at the conference included a variety of materials. Descriptions are provided for programs demonstrated by Michael Southwell, Stephen Marcus, Irene and Owen Thomas, and Shirley Keran.

"Alfred Bork served as the reactor for the conference, and his presentation includes a discussion of the principles that should guide the development of computer-based learning materials. He also discusses the need for a solid research foundation.

"In an appendix to the book, the editor describes some of the problems that instructional developers are likely to encounter as they design programs for teaching writing. The paper discusses the need for interactive programs that can evaluate the form and content of textual responses."

This book was reviewed in College Composition and Communication (Vol. 34 #3, pp. 368-9) by John C. Bean. Writing about a year after the book came out, Bean notes that already, the "book's survey of courseware is incomplete and out of date. It makes no mention of the work of many currently active researchers, including Ruth Von Blum's team at UCLA, Helen Schwartz at Oakland University (Michigan), Chistine Neuwirth at Carnegie-Mellon, Lillian Bridwell and Donald Ross at the University of Minnesota, William Marling at Case Western Reserve, or ... Joseph Bourque at Montana State University." (p. 369)

Lesgold, A.M. 1982. Paradigms for computer-based education. Unpublished article. Learning Research and Development Center, University of Pittsburg.

According to Perez & White (1984:39), "Lesgold (1982) in describing paradigms for computer-based instruction also emphasizes the need for substantial work on motivational issues. He notes that students perform certain tasks within computer systems that they may not do in other settings. In addition, Lesgold proposes a more pragmatic 'toolkit' of motivational principles to be available in authoring environments and libraries. These 'kits' would consist of programming devices and instructional suggestions supported by educational rationale. Suggestions might include principles such as (1) if the student is about to lose, interrupt and tutor to prevent losing; and (2) do not tutor before the student has a chance to discover the game for him/her self."

Lubar, David. 1982. Adventures in Videoland (Rollercoaster: A Computer/Video Adventure). Creative Computing (January), Vol. 8 #1: 60-70.

This article describes the adaptation of the adventure movie "Rollercoaster" to an interactive videodisc format. There is actually a series of three articles here: the first by David Lubar telling how the interactive programming came to be written, the second dealing with aspects of programming, and the third by David Ahl called "The Rollercoaster Game Dissected." Included in the article are flowcharts and a complete listing of the interactive program, coded in BASIC.

Madeheim, Jim, and Al Vesterdal. 1982. Hangman for the pocket computer. Creative Computing 8,4 (Apr):130.

This article lists and describes a parsimonious program which allows someone to type a word in for another person to figure out; coded in Radio Shack's pocket computer Basic.

Mangasarian, Jeffrey. 1982. Cyrillic anyone? Character editor for the Apple. Creative Computing 8,7 (Jul):120-32.

This article shows how to use systems programs on the Apple1 disk to generate character sets usable in foreign language CAI.

Mathes, Stanley L. 1982. Using Microcomputer Graphics to Train Teachers. Creative Computing, April, Vol. 8 #4: 88-94.

This article is of interest to educators on several counts. First, authors of CAI often have need for graphics, and this article includes a listing of a program that, when keyed into an Apple II+, will allow an author to draw and color on the screen and save the product. Of further interest is how the program was created: it was the product of a workshop in which teachers were taught the rudiments of Basic through graphics, an interesting approach in itself. Finally, several issues in computers in education are ancillary to the emphasis of the article, which is on the most obvious level a description of the evolution of the graphics program in the workshop. Among these ancillary issues are: how much confidence in, hence power over, the medium users might have; how computers can teach heuristics of problem solving in addition to the solution to whatever problem is immediately at hand; and how computers are capable of motivating students to enthusiastically solve these problems.

This article is one of several (see Herriott 1982) in this issue of Creative Computing having to do with computers in education. Language instructors might also look at David Lubar's review of a crossword puzzle generator for Apple II on p. 22. On p. 50, Bob Callan reviews the new Monroe EC 8800 educational computer. On p. 96, Mary Humphrey shares her insights on what kids think about the computers in their schools, and on p. 112, Eugene Raudsepp publishes the second in a series of articles on overcoming psychological and organizational barriers to creativity. Finally, Antonio M. Lopez, Jr. has an article on the educational value of pocket (i.e. cheap) computers. (cf Dede 1980)

McComb, Gordon. 1982. Speech, Speech! Creative Computing (December), Vol. 8 #12: 120-130.

After mentioning the makers of various voice synthesizers on the market today (and providing addresses at the back), McComb discusses how different TTS (text to speech) synthesizers work. Some TTS synthesizers work at the phoneme level, and others at the level of allophones. In either system, text is translated into its phonemic or allophonic equivalent, after which pronunciation variances are compensated for. Finer points of such systems include getting vowel and consonant sounds by using either a voiced or a fricative generator. Toward the end of the process, sounds are sent through filters designed to mimic the human vocal tract, and the beginning and ending of each phoneme or allophone is "sloped" (through circuitry in the synthesizer) to provide smooth transitions from one to the other. Finally, the sound is played out through a speaker.

In addition, "A few synthesizers for the personal computer market make it possible to control pitch under software control. It is also possible to pace the syllables and phrases better to create more life-like speech." Programming all this is simplified via algorithm programs which "look at each letter individually, then scan to either side to see how other letters in the word will affect pronunciation. The unit then searches a rule table so it can compare the scanned words with its stored definitions. When it sees a match, it corrects for proper pronunciation as indicated. If it doesn't see a match, it outputs the speech without any conversion." (p. 124)

Unfortunately, no one has yet elucidated the rules of pronunciation in English with 100% accuracy, taking into account all exceptions, let alone programmed such an algorithm into a computer. Still, 90% accuracy is possible in some industrial synthesizers. However, lacking such devices, most people find ways to fool the computer with mis-spellings that will produce desired sounds, for example writing "cloze" instead of "clothes". Programmers can produce desired sounds by programming in the codes for those sounds.

Included in the article are tables listing phonemes, their duration, and some of their production features, all coded for Votrax. See also related articles by Anderson and by Norman in this same issue of Creative Computing.

Merrill, Paul E. 1982. The Case Against Pilot: The Pros and Cons of Computer-Assisted Instruction Languages and Authoring Systems. Creative Computing, July, Vol. 8 #7: 70, 75-77.

In this article, the argument is made that the limitations on CAI authoring languages are not compensated for by ease of learning when compared to programming languages such as Pascal or Basic. This is because authoring languages try to "simplify the author's task by using one or more of the following techniques":

1) Reduce the domain of possible commands -- "A CAI language such as Pilot which tries to simplify the courseware author's task by reducing the number of commands in the language has a significant liability. The restriction in the domain of commands creates a restriction in the range of possible outcomes or applications ...

"The principle reason for selecting Pilot over other, more powerful, general purpose languages such as Basic or Pascal seems to be the ease with which it can be learned. However, this reasoning may be somewhat fallacious." As evidence of this, the author presents a table comparing several commands in each of the three languages which "reveals that a subset of Basic or Pascal which matches the domain of Pilot commands could be learned just as easily. However, the more powerful languages offer the advantage of additional capabilities when the author is ready to go beyond the minimal subset. If an author begins by learning Pilot and then desires greater power, he must then scrap Pilot and begin learning a new language. Why not begin with a powerful language in the first place?"

However, it is also noted that although "a subset of Pascal would be just as easy to learn as Basic or Pilot ... Rather than beginning by showing how commands can be used in a simple, straightforward fashion, most authors try to present commands in their total complexity. The Pascal language is also embedded in a powerful but complex operating system ... " which the prospective CAI author must also learn to use.

2) Provide commands and strategies which meet the specific needs of instructional application -- In addition to being limited, commands allowed are often "chosen based on an implied instructional strategy. The availability of this set of commands and the exclusion of more general commands inadvertently requires authors to use a particular strategy ... " The strategy used is usually tutorial and "Although such a strategy sounds great, in practice it is generally just plain boring. ... In fact, one could argue that the resulting CAI program is little more than a fancy and expensive page turner." Although Merrill allows that in Pilot, authors are not forced to use tutorial strategy, and that more creative programming is possible, he thinks that "the very nature of principal Pilot commands strongly encourages novice programmers to use a mediocre strategy."

3) Provide commands or routines which perform higher level tasks -- With the exception of Pilot's "match" instruction (which invokes a subroutine enabling "a Pilot program to perform moderately sophisticated natural language processing" not possible with a single command in Basic, APL, or Pascal), both Pilot and Basic are weak in allowing higher order functions to be brought into programs (i.e. via subroutines; quotes to here, p. 76). Pascal, APL, Logo, and Actor languages allow parameters to be passed from main program to subroutine and hence allow "truly modular programming", and Pascal also allows subroutines to be linked with a single command.

With programming languages, courseware authors are given a template to use which allows them to concentrate on lesson content, but the template "forces the author to turn out courseware which conforms to the template. Such templates can have the effect of enhancing the quality of courseware produced by the novice, while restricting the quality of the courseware produced by a creative author. The general quality of the courseware produced is dependent on the quality of the template."

In conclusion, Merrill notes that "Authoring systems reduce cost and effort by reducing variety in much the same way that cost and effort are reduced in fast food restaurants, tract homes and formula television shows." He offers pointers in the choice of a CAI authoring language and suggests that "When possible, subject matter experts with little computer experience should team up with programmers who have had considerable experience programming in a sophisticated language." (p. 77)

Muller, Jim. 1982. The Friendly Computer Languages. Creative Computing (October), Vol. 8 #10: 55-60.

This article discusses the various versions of LOGO available for Apple, TI, and Atari. The pros and cons of the various versions are carefully weighed, making the conclusions too complex to present here. Atari Pilot, which combines features of both LOGO and PILOT, seems to be the most versatile. However, TI's "sprites" are most comprehensible to young users. The Apple Terrapin, Inc. version of LOGO seems to be the Cadillac of the group, which is not to say that it is most appropriate for all users. This article will give readers a good basis for comparison of the various LOGO's, and will provide some useful information about the language besides.

See also in this issue Molly Watt's article entitled What Is LOGO? (pp. 112-129, and Robert Lawler's LOGO Ideas, p. 111.

Munro, Allen. 1982. An Overview of Speech Synthesizers. Softalk, May, Vol. 2: 149-156, 172-174.

The currently state-of-the-art commercially available speech synthesizers for Apple II are described, namely: Type'n'Talk (Votrax), Echo II (Street Electronics), SuperTalker (Mountain Computer), and Micromouth (Micromint). Speech synthesis and digital recording are differentiated, and trade-offs between the two are described. Basically, these are that synthesis yields lower quality sound than digital recording, but the latter uses memory more rapaciously. Of interest to language teachers is a discussion of phonological considerations and constraints in speech synthesis. (SuperTalker was included in demonstrations given by BIPACS at the 1982 TESOL Convention in Honolulu.) Those consulting this article will find a second article, "When the Apple Speaks, Who Listens?" by Melissa Milich, beginning on the same page as the Munro article.

Neumann, Robert. 1982. How to find good software. Electronic Learning 2, 2 (October): 40-41.

This article is part of a "Software Special" in this issue of

Electronic Learning. Briefly, Neumann suggests that if you can't preview software you are considering buying, you should (1) look for evidence of field testing, (2) go on the strength of reviews, particularly by teachers teaching your own subject and grade level, (3) use demonstration tapes as a last resort, and (4) consider the backup policy and reputation of the software publisher.

The rest of the Software Special is well detailed and highly informative, containing a virtual directory of sources for software and of information about software. For example, on pp. 42-3, there are addresses and sales/review policies of various software vendors. There is also a section on evaluation of software (pp. 45-8) in which an evaluation form is suggested and discussed. Criteria include: (1) appropriateness of computer for teaching a given skill, (2) consistency of difficulty in all aspects of the program, (3) degree of enhancement of graphics, sound, and color, (4) degree of interaction, which includes effectiveness of feedback and degree to which student controls pace of program, and (5) suitability of documentation.

Following the evaluation form is a list of names and features of recommended educational programs (pp. 50-5). There follows (pp. 56-8) a "Software Yellow Pages" in which several dozen sources for software reviews are listed. Also in this issue, there is a listing of publishers who will consider marketing home-produced software (p. 29) accompanying an article by Andrew Ragan entitled "Marketing your own software" (pp. 28 & 30). Finally, there is a listing (pp. 26-7) of school administration programs and their vendors.

Onosko, Tim. 1982. Visions of the Future. Creative Computing, January, Vol. 8 #1: 84-94.

Variables in videodisc selection are described. There are three formats: laser-optical, CED, or Capacitance Electronic Disc (which uses a stylus), and VHD, or Video High Density. Reasons are given for the superiority of laser-optical systems over the other formats. Three levels of interactivity are then identified: manual, built-in microprocessor, and computer interface. Characteristics making videodiscs either "consumer" or "industrial" are discussed. Finally, work done at U. of Utah and at Brigham Young is mentioned, as is the axiom that "the higher the fidelity of the automated image, the stronger the transfer of learning." So much for theory; the balance of the article is about how videodiscs are being used.

Some existing applications of videodiscs are: (1) "How to Watch Pro Football", (2) "First National Kidisc", (3) a version of "the Sears Catalog", (4) "Patsearch" -- a doctor/patient database, (5) Perceptronics's "Tank/Gunnery Trainer", (6) MIT's "movie map" of Aspen, and (7) a tour of the National Gallery of Art. Either being planned or envisioned are a course in "Master Cooking", a program of college campus tours, and various college courses. As to the future: "Will it be possible to record on a videodisc? ... practically every manufacturer of videodisc hardware has a disc recorder under development." Lastly, "there are still solid-state devices, like bubble memories, that may make discs totally obsolete." (p. 94)

Peelle, Evan. 1982. Take the Trauma out of Training. Personal

Computing, June, Vol. 6 #6: 76-80, 126.

Although geared toward those working in business training, this article has obvious applications to general education. The article begins by discussing the difference between "software authoring systems" and "courseware", the former enabling authors to develop the latter. One such authoring system is PASS, or Professional Authoring Software System, which was developed on the Bell & Howell version of the Apple II (and is hence compatible with either). PASS has color, graphics, allows essay responses, and allows interface with video tape or disk. Although the system "is designed to be easily used by non-programmers", PASS users (among which are Standard Oil, General Motors, and Farmers Fund Insurance) can draw on assistance from independent consultants skilled in PASS.

Most of the authoring and courseware systems mentioned here are designed to be as user friendly as possible. Of those meant for use with Apple, Learning System, a product of Micro Lab, and Apple Computer's Pilot are mentioned, and it is noted that the video interactive version of Pilot, SuperPilot, is due out shortly.

Another CAI authoring system, WISE, runs on a WICAT computer. Still in the testing and developmental stages, WISE is menu driven, writes its own code, and has advanced graphics, video interaction, and computer speech capabilities. Also mentioned are Control Data, which now has seven to eight thousand hours of courseware on Plato, and Cdex, which is producing business oriented courseware.

The article also discusses some advantages and limitations of CAI in training programs. Among the advantages: (1) Advances in courseware design "have removed much of the threat and resistance" to CAI. (2) Interaction with computers is dynamic and active and engages the learner "cognitively, visually, physically, and soon, auditorilly." (3) "The generation of those people experienced with video and home computer games, as well as the home and office personal computer, are likely to take readily to this extension of technology." (4) Instruction can be self paced and under the control of the learner, and progress can be measured against well established criteria. (5) "Learning is low risk" both to the learner insofar as "mistakes are a matter between the individual and the computer," and to the trainer, insofar as simulation may obviate the need to tie up and risk damage to valuable equipment. (6) A training program can be offered "coherently and consistently, which can be especially helpful if you have a need for standardized content and quality of instruction." Quality of training is not affected by shortages of or waning enthusiasm in instructors and can be precise, cost-effective, fast & efficient, and accessible to people in remote locations.

There exist several limitations to CAI. In this regard, readers are cautioned against a tendency to "become enamoured of 'gimmickry' at the expense of real results" and inappropriately forcing content best taught by other means into computer mode. Further limitations are the fear that learners have of their first encounter with computers, fear of trainers that they will lose their traditional roles to computers, and the fact that cost advantages are more pronounced with larger organizations who can spread costs of CAI over larger aggregates of people and activities.

Rose, Ken. 1982. Adventures in adventuring: The attack of the 3-toed ogre. Softline 1,3 (Jan):26-31.

The programming described here illustrates implementation of a battle sequence. Even if teachers don't like battles, there may be algorithms here that programming instructors can adapt to adventure applications. A listing in Applesoft Basic accompanies the program.

Rose, Ken. 1982. Adventures in adventuring: Please parse the Zork. Softline 1,4 (Mar):14-17.

Half of this article is about a series of computer games called Zork which, since they require input from players in the form of verb plus subject noun (e.g. 'Take key'), may in themselves be of interest to a certain kind of ESL learner. But of possible interest to CAI authors who program in Basic, especially those using Applesoft, is the second half of the article, which contains a listing of a program which will parse simple sentences of the above mentioned variety. The present bibliographer has further extended the program described here so that the program accepts imperative sentences of the verb-determiner-noun variety, and he (I) would be happy to provide soft copy to anyone who has read this far in the bibliography and who will send me a disk in a self addressed mailer.

Rose, Ken. 1982. Adventures in adventuring: From here to there and back again. Softline 1,5 (May):10-13.

This article presents a listing of a game called "A Voyage to the Planet Pincus", illustrating parsing techniques and algorithms for adventure game programming. It is accompanied by a listing in Applesoft Basic.

Rose, Ken. 1982. Adventures in adventuring: Themes like old times. Softline 1,6 (Jul):10-6.

This adventure game illustrates timing via for/next loops; listed in Applesoft Basic.

Rose, Ken. 1982. Adventures in adventuring: The thing's the thing. Softline 2,1 (Sep):28-30.

This article describes a mystery adventure with emphasis on handling (picking up, dropping) objects; listing in Applesoft Basic.

Rose, Ken. 1982. Adventures in adventuring: Amazing we will go. Softline 2,2 (Nov):10-12.

This article explores maze programming, and is accompanied by a listing in Applesoft Basic.

Ross, Tom. 1982. CAL at UPM: An Instructional Aid for Students and Teachers. TEAM (Teachers of English Arabic Monthly), Summer, #42: 8-14.

Language teachers with backgrounds in literature and in humanities are often "confused or even intimidated by computers" and lack "the time and inclination to learn basic programming skills," (p. 8) depriving both themselves and their students of valuable experiences with computer-assisted instruction. To help ESL instructors at the University of Petroleum and Minerals in Dhahran, Saudi Arabia, to overcome these limitations, a very user friendly system of CAI implementation has been developed. This article simply and concisely describes that system.

Previously, an authoring system had been used at UPM, but it was found to be too difficult for authors to master and too time consuming for those who did, and it was found that it was difficult to vary the format of the resulting lessons (see Stevens 1980 & 1981 for more about that phase of development of CAL at UPM, and Merrill 1982 for limitations of authoring systems). With the new system, instructors may create a wide variety of lessons by using a master program which in turn draws on ten other programs to create the desired lesson. According to Ross, the master program requires a minimum of commands and simplifies use of the system for both authors and students.

Besides providing CMI capabilities, the system allows authors to make use of several lesson format possibilities. Components are as follows: (1) An exam program allows timed drill & practice or quiz capabilities. (2) A speed reading program trains students to skim a passage at first to answer general questions, and gradually to read it more slowly to get more and more specific information. (3) A cloze reading program lets students guess at missing words and then asks questions about the passage in hopes that "this will lead them to realize that they can understand a passage even if they don't know every word." (p. 11) (4) One program scrambles sentences and another scrambles paragraphs. Each program randomizes chunks specified by the author, numbers them, and displays them for students to restore to their original order. (5) Another program allows display and paging of text.

Ross reports that the effectiveness of this mode of instruction is apparent from the "tremendous surge" of students using it at all hours of the day and night, and from the fact that use doubles or triples before exams. He notes also that it would be possible to change and add to the existing selection of programs as teachers think up "ways to computerize some of their most imaginative teaching techniques." (p. 13)

Saracho, Olivia N. 1982. Planning Computer Assisted Instruction for Spanish-Speaking Migrant Students. Journal of Educational Technology Systems, Vol. 10 #3, 1981-82: 257-260.

The Computer Curriculum Corporation (CCC) has developed computer based lessons in language arts, mathematics, and reading to help Spanish-speaking migrant students overcome the "great failure" of compensatory education, to which they are normally relegated in

American public schools. In this article, several studies are cited attesting to the effectiveness of these lessons (including one which found more favorable attitudes toward computers in students NOT using them as compared to students in the CAI program). The beneficial effects of CAI "may be attributed to the way the teacher used CAI, the individualized instructional program, the students' extensive practice, and the immediate feedback which students recieved." (p. 258)

The author feels that, considering the huge sums spent on "unsuccessful educational programs" for these students, "the use of computers to instruct such students seems especially appropriate." (p. 259) It is pointed out that these computers are used not to replace teachers, but to assist them in planning the optimal curriculum for each individual student. Ways that individual learning styles should be taken into consideration in formulating this planning are noted. Also, it is mentioned that care should be taken that learners are not stigmatized by assignment of remedial work, as this affects their attitude towards the computer.

"CAI can become a meaningful instructional technique provided teachers understand its principles and its potentials," and provided "it is used with a clear purpose in mind. ... Even though CAI can interact with students and is adaptable to a variety of situations, it may not fulfill every student's needs, especially in the affective domain." (p. 259)

Scollon, Suzanne & Ron Scollon. 1982. }RUN TRILOGY: Can Tommy Read? Paper presented at the symposium "Children's response to a literate environment: literacy before schooling" University of Victoria, October 5-9, 1982.

Tommy is the Scollon's four year old boy who successfully manipulates the storage and retrieval systems on the family computer. One of the games he plays is called Trilogy. Later, he sees a book in a bookstore with the word Trilogy in the title. He recognizes the word. Can he read?

This is only one of the questions addressed by the Scollons in this thought provoking article. Basically, the article is about literacy in a technologically changed world, but subheadings include discourse analysis in the medium of asynchronous computer mediated conferencing, where participants can suspend certain norms of more focused modes of conferencing, among which is adherence to the conduit metaphor, a norm of communication whereby a message starts with a speaker and is transmitted as a package to a listener. In computer conferencing, participants have widely enhanced choices as to what topics among those nominated by other participants they wish to address; the result is "a change in possibilities of discourse not seen in the world at least since the introduction of widespread printing."

Just as the conduit metaphor does not hold in discourse, so it is not an appropriate metaphor in education using computers, yet it is the "predominating metaphor" in drill and practice programming, the result of which "children tend to avoid." Children much prefer interaction with a computer. Therefore, "The role of the 'writer' of the software <is not> of someone communicating to someone else. ...

The role of the user is by the same token, not a role of receiving any message but rather one of exercising the options available for the creation of a discourse in the micro-world presented by the designers." (p. 7) In this micro-world, creativity is not held by the writer, as it is in the conduit-world, but is shared with users, and this is "attractive" to children and "threatening" to adults.

As evidence of this, the Scollons note the relative ease with which children (as compared to adults) learn computer operating systems. Possibly this is because adults see computers as functioning linearly, and thus they tend to get hung up at one step, thinking they must overcome that problem in order to proceed. Conversely, "The child approach is global and recycling." Children tend to experiment until the problem is solved. Thus, success with computers runs parallel to freedom from approaching them with "relentless, linear logic."

The Scollons feel that, in fostering alternative possibilities of discourse, especially in young children (who are not so fossilized as adults in unrelenting forms), the computer stands to alter our approach to literacy in ways that will depend on the micro-worlds created by imaginative computer users. Impacts include a link with our pre-printing past, and "the fostering of levels of insight into the nature of representational systems that have previously been extremely rare." The Scollons conclude: "We do not know what other, perhaps darker possibilities will be fostered."

Shostak, Robert. 1982. Computer-assisted composition instruction: The state of the art. In Lawler, Joseph (Ed.). Computers in composition instruction. Los Alamitos, CA: SWRL Educational Research and Development. pp. 5-18.

This is an interesting article in that it attempts to integrate developments in educational technology with the process approach to writing. Breaking that process into prewriting, composing, and editing/revising, Shostak gives specific examples of computer programs which deal with these discrete units of process.

PREWRITING -- (1) Story Maker, by Andee Rubin, lets Students "choose options from already written program segments" (p. 8) and manipulate these to compose stories with various outcomes. Students control the creative process while the computer takes care of the more mundane mechanical details. "Very early in the program the child begins to learn that making one choice rather than another will influence how the story will flow as well as how it will end. Because this program provides an early experience with manipulating language at a high cognitive level, it seems to have a great deal of promise for developing the kinds of skills one needs to become an effective writer." (2) Burns's program modeling heuristics for invention is based on the work of various philosophers (treated also in Burns and Culp, 1980, and in Burns, 1982).

COMPOSING -- (1) Word processors simplify entry and revision of text, motivate students to write more (if not better), and can perform mechanical checks on spelling and even syntax. (2) Compupoem, by Stephen Marcus, "encourages students to think about what they want to say, an it even provides the opportunity to see instant reproductions of their poems in different formats". (p. 11) (3) The Electric Poet, by Edmund Skellings, takes the idea of computer-assisted poetry further, so that it stimulates and integrates both hemispheres of the brain, resulting in "optimal conditions for creativity." (p. 13) The Electric Poet uses color, an "infinite" variety of display patterns (including simulated 3-D), and animation to make poetry appear (or flow, or whatever) on and across the screen. (See Davison, 1982, for a public domain poetry "weaver".)

REWRITING AND EDITING -- (1) The Navy Programs of Robert Wisher deal with organization and the development of style. One of these presents several numbered sentences from which students select the topic sentence and organize the rest into a logical paragraph. Then they are prompted to edit the paragraph "in a variety of ways in order to clarify meaning and provide stylistic effects ... position the topic sentence, place short sentences before longer ones, delete unimportant sentences, and insert a single sentence of their own." (p. 14) Another of Wisher's programs "has the student combine phrases into meaningful sentences. The student can see immediately how phrases can be combined to form clauses, and how clauses can be combined to form sentences." (p. 15) (2) RSVP is treated elsewhere in this bibliography (see Kotler and Anandam, 1983). (3) The Writer's Workbench, from Bell Laboratories, is a set of 32 programs which correct spelling, punctuation, and grammar, and which will "analyze style and provide feedback to the author on sentence length, cliches, wordiness, and jargon." (p. 17) Basing its analysis on data drawn from, among other things, Strunk and White's The Elements of Style and examples of scientific prose, the program draws up an analysis of the student writing (readability, average sentence length, percentage of complex sentences, percentage of passives, etc.) and then suggests remedies which students may consider, and perhaps decide to reject.

Concerning all of these programs, Shostak offers a cautionary note: "We cannot look at computer-assisted instruction as a panacea. Teachers are not going to become good writing instructors simply because they have a unique new technology available to them. They must first understand what it means to be a writer -- to experience both the pain and the joy. They must understand the process, and they must be able to integrate the latest innovations in instructional technology into an already sound writing program." (p. 7)

Smith, Mike. 1982. Pilot for the Apple. Creative Computing, July, Vol. 8 #7: 62-68.

This is a perceptive and comprehensive review of the Apple Pilot CAI authoring system by an apparently well qualified reviewer with experience using Pilot and knowledge of Pascal and advanced programming possibilities. These abilities result in some useful hints for users of Pilot, one example of which is a means of hooking up the shift key to replace Control-Z in capitalization. The author also mentions that in using the graphics capabilities, it is useful to draw a picture on a piece of clear plastic which can then be put over the screen, allowing the desired picture to be traced using Apple Pilot.

Limitations as well as strong points of Apple Pilot are detailed, as are the salient features of all the editors (besides text and graphics, Apple Pilot allows character set generation and storage and sound capabilities). Mainly, this is a thorough description of Pilot, written at a professional, but not unpleasantly technical, level. It would be of use to someone contemplating buying Pilot, as well as to someone who already has Pilot but doesn't quite know how to get started using it.

See also "The Case Against Pilot", which follows this article (Merrill 1982). This issue of Creative Computing is also of interest to imaginative developers of CAI in that it contains many articles on graphics peripherals and on educational software for various microcomputers.

Smith, M. R. 1982. Pilot-to-Basic Translator. Creative Computing, October, Vol. 8 #10: 226-230.

- - - - - 1982. Pilot Tutorial I. Creative Computing, November, Vol. 8 #11: 181-182.

- - - - - 1982. Pilot Tutorial II. Creative Computing, December, Vol. 8 #12: 243-253.

In the first of these articles, Mike Smith describes a program he has written which "takes each Pilot command and generates the equivalent series of Basic statements stored in a program called LESSON NAME where LESSON NAME is any lesson name." (p. 226) In the following two articles, he elaborates on the use of this translator. Even though some of the description concerns this particular translator, there are hints and explanations that apply to the Pilot language in general. Much of the first article is directed toward programmers, but should also be of interest to the layman who would like insights on the relationship between Pilot and Basic.

One useful feature of the translator is that it includes a Basic (B:) instruction which allows any Basic command to be imbedded into the Pilot program. Although this would conceivably make possible all capabilities of the latter language in the CAI program, Smith seems to think that the added power is "unnecessary". An experienced programmer himself, Smith says that for writing lessons quickly, he is "growing to like Pilot".

At the end of the final article, there is a wish list of things to consider when obtaining a version of Pilot for CAI development. For example, the program should enable the computer to judge the syntax of the Pilot commands as they are typed in. In addition, it should be speedy, allow the student to print during the course of the lesson, be able to call other programs written in Basic or Pilot, and should be written in modifiable code. Smith's translator will do all of this, and he offers to copy it for anyone who will send him a labelled disk, $5 and a self addressed envelope, plus about $2.50 for return postage from his address in Canada: 304, 86th Ave. SE, Calgary, Alberta, T2H 1N7.

Steffin, Sherwin. 1982. What Does the Computer Teach Best? Softline, March, Vol. 1: 23-25.

Three learning domains, psychomotor, affective, and cognitive are identified and loosely defined. "Generally speaking, educational software is most frequently designed to address skills within the cognitive domain." (p. 23)

A design model follows (p. 25), some characteristics of which are: "The ease with which we can design effective instructional strategies that involve the use of the computer and other media is directly related to the degree to which we know what we want the learner to be able to do after instruction. ... educational objectives or goals must be stated in clear, unambiguous, observable, measurable terms in order to be of the most use. ... and as we all know, step-by-step planning is essential when it comes to designing curricular materials that are to be presented to learners via computer. ...

"Generally, in situations where learner objectives are clear and agreed upon the computer is in an excellent position to serve as an instructional tool. But to the degree that objectives are vague or ambiguous, or where there is wide discrepancy in the views of various teachers about intended outcomes, lecture/recitation, classroom discussion, written essays, or the viewing of well prepared film or video demonstrations are likely to be more useful tools than the computer."

Steffin, Sherwin. 1982. The Future in Education: A -. Softline, May, Vol. 1 #5: 23-24.

In this article, Steffin continues his discussion of educational computing. The article begins with mention of the impact of new developments in computer hardware and software which are certain to give educators even more powerful tools to use in producing courseware. For example, greatly enhanced memory combined with the greater efficiency of computers is enabling users to access larger and larger data bases. A dictionary (with thesaurus, antonym, and synonym capabilities) is in the works. New flat screens allow briefcase sized portability, light pens offer enhanced graphics capabilities, and touch sensitive CRT plates expand input possibilities. Meanwhile, interactive computer generated graphics with videodisc coupling await only three developments (standard format, consumer recording capabilities, and appropriate interface software) before their impact is felt. Concludes Steffin, "As learning theorists and educators gain in their understanding of the microcomputer and its peripherals, we can certainly look forward to enhanced, elegant, and sophisticated software that brings together the knowledge and discipline of the educator with the flexibility and interactiveness of the computer." (p. 23)

Computer grade books and record keeping packages are at present "in a most crude and formative stage compared to what may be available not too long from now." (p. 23) And what may be available encompasses a means of "Assessing diagnostic data for each student's approaches, successses, and failures in problem-solving activities ... " But to what extent is gathering data an invasion of privacy? What is the danger, if any, of the computer's becoming an insidious form of mind control? These questions are left dangling.

One radical effect of the computer is that it "is going to have an impact on where learning occurs," Since the Quincy box, the most prevalent institutional architectural design, "leaves much to be desired in terms of fostering intellectual divergence," doing away with the offending central locations appears to be a justifiable solution. In this event, "the teacher's role can change from that of a broadcaster of instruction to a manager of instruction.... Time and space need no longer be the limiting factors for the acquisition of information."

Swenson, Richard P. and Chrys Anderson. 1982. The Role of Motivation in Computer-Assisted Instruction. Creative Computing, October, Vol. 8 #10: 134-139.

Noting that "the best teaching methods are those that rely most heavily on positive techniques to motivate people" and that "motivation has been identified as a critical component in learning," the authors feel that what is known about motivation in learning should be applied to CAI programming. Hence, this article explores some factors involved in motivation and relates these to reinforcement in CAI.

First of all, the authors stress throughout that it should never be taken for granted that a given reinforcer will elicit a correct response. Empirical testing must be carried out whenever possible to determine whether the learner will prefer the positive or the negative reinforcer (examples are given of cases where children eschewed correct answers in order to trigger the more amusing incorrect answer responses.)

Reinforcement is classified on one level as being primary, secondary, and generalized, and on another level as being active, passive, or interactive. Primary reinforcers don't have to be learned, and an example might be an aesthetically pleasing visual display. Secondary reinforcers are learned (in some cases, through socialization), and examples are praise or permission to play a video game. Generalized reinforcers are also learned, but they are essentially tokens which may be accumulated and exchanged for something of value, for example points, stars, or grades. People seldom tire of receiving generalized reinforcement, whereas they become quickly sated from primary and secondary reinforcers. However, only primary and secondary reinforcers can be totally contained within the confines of the computer. Thus, generalized reinforcement is most lasting and effective, but only if the tokens have value in the real world.

Passive, active, and interactive reinforcement refers to the degree of "obtrusiveness" of the reinforcer. Basically, passive reinforcers give information as to the adequacy of the response (e.g. 'That is correct' or 'No, try again.') Active reinforcement provides this much information plus additional visual or verbal stimulation (e.g. happy faces, or 'Good work!'). Interactive reinforcement provides all of this and in addition allows user participation. The example given is a reinforcer allowing the student to play a video game on completion of a task.

Finally, four variables governing the effectiveness of reinforcement are discussed: timing, appropriateness, relevancy, and configuration. Timing subsumes immediacy (0.5 seconds is ideal), scheduling (reinforcement should occur every time at first, then gradually be thinned out), and duration (this will depend on the type of reinforcer). Appropriateness takes into consideration audience factors, such as age and (dis)abilities. Relevancy concerns the fact that "To be maximally efficient, reinforcement should be not only motivational but informational as well. In other words, the event designed to be reinforced should, if at all possible, also add to the user's information about the subject matter." Configuration concerns the feedback routine as a whole. If the student responds incorrectly, then he "requires the basic feedback that a given response was incorrect, but any additional, judgemental information is not only unnecessary but undesirable." Two final considerations: (1) Motivation can only be sustained so much before anxiety enters the picture and performance falls off. (2) "There is a danger that reinforcement routines can be distracting", for example by putting the student in a "mood that is detrimental to efficient learning". (All quotes in this paragraph, p. 139)

The', Lee. 1982. Educational Software for the Home. Personal Computing, June, Vol. 6 #6: 48-52, 102-114.

This is an article dealing in the philosophies and opinions of educational software producers concerning their products. The emphasis is on tutorial material for American school children, but there is much in the article of interest to anyone working in CAI. Interestingly, CAI is considered in this article to include productivity tools (i.e. word processors, data-base management software) as well as drill & practice tutorials and simulation programs.

Some of the obvious advantages of CAI are noted: i.e. (1) the ability of the computer to allow immediate feedback, correction without criticism, and student control over and interest in learning, (2) the ability to appeal to disadvantaged learners, and (3) the ability to do all of this with "the patience only the truly mindless can achieve." (p. 50) Furthermore, it has been shown in at least 27 studies that "in every case the net effect was that CAI was superior to or equal to the conventional classroom-environment methods. Some students showed improvement of up to 50 percent on scores ..." (p. 48).

The article includes a listing of names and addresses of 63 purveyors of educational software. As to the quality of this software, "the most fundamental problem is that most educational software is written by programmers who know nothing about pedagogy. Software must be designed with clear learning objectives in mind." (p. 52) Thus, whether or not there are such learning objectives is one criterion for evaluation of any unit of educational software. (cf Smeltzer 1981; but Ahl notes in one of the summer, 1985, issues of Creative Computing that educational software is now being more and more produced by programmers in conjunction with educators, with improving results.)

The last half of the article deals with several of these criteria for evaluating educational software. Of all criteria given, the following might be of prime consideration to language instructors. For example, the software should be friendly (e.g. menu driven) to the extent that getting from one place in the program to another is no more difficult than thumbing through a book. Also, use of the program should be self explanatory (and there should be adequate documentation in any event). In addition, the best software should present information clearly and in consistent format and include all the cues to comprehension (i.e. upper & lower case) found in printed matter, use color, graphics, and sound when appropriate, and allow automatic remedial branching. In short, "it should exploit the unique capabilities of the computer. ... There is no reason to buy software that isn't superior to a book." (p. 114 -- See Herriott 1982 for a list of seven of these "unique capabilities".)

Appropriate reinforcement should be provided, and should help the student "not only catch mistakes but analyze them for patterns, which helps the <student> understand how he made the mistake, and not just that he made it." (p. 110) Also, the program should accept a wide range of correct answers so as to avoid telling the student he is wrong when he isn't. Finally, the more flexibility allowed in the ways the lesson material can be presented and sequenced, or in the levels of difficulty available, the better.

Urrows, Henry and Elizabeth Urrows. 1982. Videotex for Learning. Creative Computing, May, Vol. 8 #5: 50-60.

This article is an in depth review of mass data base systems now being used in Europe, Japan and Canada, but as of yet little known in America. Comprehensive in scope, yet written with a bias toward education, the article gives several examples of successful use of videotex in furthering extra-curricular education in various countries and makes interesting suggestions as to how this instructional medium might be expanded as the hardware for it (video display, keyboard, communications interface, and modem or accoustic coupler -- See Ahl 1982) becomes more and more ubiquitous. (And see Shur, 1983, for an update on videotex in the U.S.)

One-twelfth of all university alumni in the U.K. hold degrees from Britain's Open University, whose courses, with the help of videotex, are given over TV and radio, with "limited face to face contact with instructors at 255 study centers." (p. 53) In Canada, Telidon has been established to allow people to engage in interactive degree oriented instruction from their homes or offices. Eventually Telidon should have academic research data bases, "innovative graphics", video and voice capabilities, and, as postage and printing costs continue to increase, facilities for electronic publishing.

Residents of Columbus, Ohio, in the U.S.A., have had access to Arete's Academic American Encyclopedia (indexed by keyword, article title, and discipline or subdiscipline), to an Online Computer Library Center, and to certain elementary school lessons using videotex on an experimental basis. (There is also a condensed encyclopaedia on Prestel in the U.K.) As for other countries, videotex systems in France, Japan, and Venezuela are briefly discussed.

What is the point of nationally maintained videotex data bases? "Interactive devices offer unheard of opportunities for life-long learning ... The contents of millions of books and journals will be almost instantly accessible at the press of a button. The great teachers will be there, even though electronically, to provoke and stimulate, and everyone ought to be able to afford them. Equal opportunity to learn is no longer only an unrealizable ideal." (p. 56 -- cf Braun 1980)

Varven, Jean. 1982a. The Schoolhouse Apple. Softalk, May, Vol. 2 #9: 36-40.

In this first installment of a column planned as a feature in subsequent issues of Softalk, Varven notes that whereas "It is evident that the microcomputer is being seen by many as an educational tool with no limits to its usefulness and versatility," (p. 36) those interested in the subject have no way of keeping up with fast breaking developments in the field. Thus it is intended in this column to review educational software, speculate on what present developments portend for the future, discuss computer literacy, discuss evaluation of courseware, discuss frustration with and resistance to computers, discuss authoring programs and other interactive hard and soft ware, and publicize sources for more information.

This initial installment contains an annotated listing of a few software producers, introduces the Apple Education Foundation (which gives grants to people "developing new methods of learning through the use of small computers" in fields including bilingual and foreign language education), and reports on the Seventh Annual West Coast Computer Faire.

Varven, Jean. 1982b. The Schoolhouse Apple. Softalk, June, Vol. 2 #10: 207-210.

This installment focuses on computer literacy. Varven borrows from Arthur Leuhrmann's idea that computer literacy is hands-on control over computers (see the March 1982 issue of The Computing Teacher). Thus, a computer literacy course would teach a computer language, but more importantly, students would learn "a way to write, a way to think -- a way to organize their ideas and to decide how to solve a problem in a logical, step-by-step fashion ..." (p. 207)

The problem of computer literacy for teachers is being addressed through grant programs and through teacher training programs such as Stanford University's Microcomputers in Education, where in two weeks, teachers learn basic skills, peer tutoring techniques, and more advanced skills such as graphics, computer music, and database access. Other means of promoting computer literacy, the ComputerTown concept, an annual CAI conference at the University of Oregon, and the Technology Education Act of 1982 now before Congress, are also discussed to varying degrees.

Varven, Jean. 1982c. The Schoolhouse Apple. Softalk (December), Vol. 3 #4: 239-246.

In this installment of her monthly column, Jean Varven deals with the computer-educational scene around the country. The Investment in People program in California is discussed, as are source books and other resources for Apple educators. There are blurbs on companies producing educational software for Apple, such as

Encyclopedia Britannica and Plato. The latter part of the article is a LOGO tutorial by Jim Muller.

This issue of Softalk is of further interest to educators, since a large part of it (pp. 136-223) is essentially a catalog of (some) hardware and (mostly) software available for the Apple. Listings are by company, and educational listings are on pp. 174-189. There is no independent evaluation of any of the items listed, but the listing, with names and mailing addresses of all companies concerned, is in itself valuable.

Wager, Walter. 1981-82. Design Considerations for Instructional Computing Programs. Journal of Educational Technology Systems, Vol. 10 #3, 1981-82: 261-269.

According to its abstract, "This article reviews four different CAI algorithms in light of an instructional theory based on the work of Robert Gagne. The author concludes that different types of CAI supply different events of instruction to the learner. This implies that different types of CAI are more or less complete as instructional strategies, and that different types of CAI are more or less appropriate depending on the nature of the capability to be learned. Designers should be aware of how the CAI programs will be used and work toward providing the instructional events necessary to be effective." (p. 261)

Wager is mainly concerned that the availability of user friendly authoring packages is resulting in deficient courseware being produced by instructors showing "lack of concern with the application of principles for the design of the instructional materials derived from a consistent and valid theory base" (p. 269). So, Wager examines the algorithms for tutorial, drill and practice, simulation, and games. The tutorial algorithm in particular seems amenable to adaptation to a Gagne learning algorithm, which would result in a CAI lesson having the following components. (1) First, a motivating display would provide a set for learning. (2) Next, objectives of the lesson would be made clear. (3) The learner would then be informed of what skills were necessary to do the lesson, or would be given an entry quiz. (4) A stimulus would be presented in the form of new information, a definition, a rule, or a representative problem. (5) Some form of learning guidance, a mnemonic for example, would then be presented. (6) Performance which is "congruent with the objectives of the lesson" would then be elicited. (p. 264) (7) One of four types of feedback (simple yes/no, reinforcement, punishment, or elaborated feedback) would be given. (More on feedback in CAI: Swenson & Anderson, 1982) (8) Performance would then be assessed, perhaps off the machine. (9) Finally, steps would be taken to enhance retention and transfer.

The other learning algorithms also have their places in CAI, but Wager feels that the tutorial type is the most efficient and most widely used. Tutorials can be either linear or branched. The relative complexity of the latter "is why so many tutorial programs end up being linear. Some authoring programs ... promote the development of linear programs."

Following the suggestions in manuals and guides accompanying these authoring programs is not likely to be of much help in producing viable materials. "Without a sound theoretical position it is difficult to come up with a consistent set of rules for CAI lesson design." Such a set of rules would "consider the types of learning, learner characteristics, and the situation in which the CAI will be used." (p. 268) In developing the lesson, the author would first classify the objectives of the lesson, then properly sequence these objectives, and finally produce program elements based on an information processing model such as Gagne's.

Watt, Don. 1982. Which computer should a school buy? How to get the most for your money no matter what your budget. Popular Computing 2, 2 (December): 140-144.

This article pursues various scenarios in which a school or department has $500, $2500, or $15,000 to spend for educational computers. Before deciding how to allocate the funds, Watt dispells the fallacies that one should try to get the greatest number of computers for the money and that the exact use of these computers can be rigidly specified in advance.

With $500, Watt would purchase 5 ZX81's. Given $2500, he would buy one Apple II. The fact that Apple supports Logo and that it has "the largest range of available and about-to-be-available educational applications" makes Apple Watt's "choice for an all-purpose educational computer." (p. 144) With $15,000, Watt's decision would depend on whether he was working at the elementary, middle, or high school level. At the elementary level, he would buy as many TI LOGO systems as he could (TI has since ceased producing the TI 99/4A). For junior high, he would choose Apple. For high school, he would buy a different computer for different departments; for example, Atari with graphics for art and with light and heat sensors for science, Apple with a synthesizer for music, and TRS-80 word processing for English and business.

Woodruff, Earl. 1982. Computers and the composing process: An examination of computer-writer interaction. In Lawler, Joseph (Ed.). Computers in composition instruction. Los Alamitos CA: SWRL Educational Research and Development. pp. 31-45.

This article characterizes three modes (consultative, directive, and collaborative) in which computers might assist students in their writing, and describes three programs which each addressed one of these modes. The programs were all tested for effectiveness, and results of that research are reported here.

The program in the consultative format was essentially a text editor from which students could request help if needed. One form of help was in developing arguments. Here, the computer would offer a menu of choices, for example: statement of belief, explanations, reasons, refutation, examples, and the like. Students had to choose from the menu to get an appropriate explanation. Another form of help was in producing the next sentence. Here, the computer would search the previous sentence for key words and then prompt the student for more information. Help was also provided in allowing students to change words, or to flag words they were unsure of so that they could be located later. Experimentation did not yield significant results favoring this approach for facilitating writing. Rather than encouraging students to focus on their writing holistically, this program seemed to focus their attention inordinately on the next sentence.

The directive mode was used in an attempt to rectify the latter problem. Instead of letting the students request help on their own, the computer was programmed to intervene whenever a sentence was terminated. This intervention was in the form of one of 26 questions which appeared according to how the previous question had been answered. The program began by asking the student if he or she had an opinion on a given topic. When the student responded yes, the computer would allow a sentence of input, and then would ask if that opinion held true for any circumstance. If the answer was yes, the computer asked if there was a particular reason for the opinion given, and would wait until the student formulated a reason. The program continued "in this manner, leading the student through questions designed to encourage clarification of the reason, evidence and support for the reason and opinion, inclusion of more reasons, and, finally, a summarization of the paper." (p.37) Some questions had to be answered, but most could be skipped by pressing a 'continue' key, or the question could be delayed a sentence or more by pressing the 'hold' key.

This program was tested in a three step experiment, the order of steps being the independent variable. Students produced rough drafts of an essay and then were allowed to revise in two sessions. In both sessions, they used the above program, but in one of these sessions, they used a version of the program that did not intervene with questions. When the directive program was used as the second step, the compositions were rated significantly lower than when the directive program was used as the last step. It turns out that the students were not familiar with the directive program, and comparing these results with another study in which students were asked to perform another unfamiliar action while writing, speaking aloud, it is concluded that "Apparently, any such additional task demand diverts mental capacity from the main task and results in writing that appears simpler or less mature." (p. 38) Therefore, the researchers could only speculate about the long-term effects of directive programming. They also report favorable attitudes from students who used the directive program, and that students expressed an intent to use such questioning strategies in future writing, but as these findings were based on just one exposure to the program, they also seem rather speculative.

Finally, in a collaborative program called EXPLORE, the computer was used to store 308 sentences on the topic of the effect of T.V. on young people. Half the sentences favored T.V., while the other half opposed it. The sentences were further subdivided in that there were versions of each sentence in seven different rhetorical styles. Students selected sentences from those offered by the computer, accepting or rejecting them according to whether or not the style of writing was appropriate to the discourse task the students had been given. Eventually, students would have a composition which they could print out, reorder, add to (drawing from the 308 stored sentences), delete from, or even translate into a given rhetorical style. "EXPLORE is designed to ease the mental burden of composing. Since the computer is producing the content and linguistic form of the text, students are able to produce more essays per class than they would be able to under normal conditions. With this facility, students are allowed to concentrate on aspects of the composition task that are seldom made conscious. Furthermore, students are encouraged to experiment with novel forms of structure and to evaluate the relative effects of style. And it is through such efforts that we expect the users to construct some of the higher, more sophisticated, composing strategies." (p. 41) This was to some extent borne out in tests done with 12th graders, who produced essays of greater clarity and focus than they normally did; and furthermore, 90% of these students were of the opinion that they had learned something about paragraphing from this program.

The author feels that the latter program, in which the computer handles content and mechanics while the student concentrates on strategy, provided practice which was in this case the most effective and which would have been difficult to arrange in other circumstances. The author and his colleagues envision further, and improved, work of this nature. "The possible roles one may design for a computer are limited by the computer's capabilities and by our applicable knowledge of the composing process. But both these areas are advancing rapidly." (p. 44)

--*- 1983 -*--

Ahl, David. 1983. Learning can be fun. Creative Computing 9, 4: 98-143.

This is an in-depth review of 29 recent commercial offerings of educational programs. Of the 29 programs, 8 concern either word recognition, reading, vocabulary, or spelling. An additional two are driver programs, in which educators may couch their own drill and practice materials in either match game or tic tac toe formats. All but three of the programs run on Apple (and the remaining three run on Atari). This article will be informative for anyone who wants to get an idea of what is commercially available and aimed at a cross-section of educational realms. Descriptions of some of the programs may also give software developers ideas applicable to their own projects.

Arceneaux, Charles D. 1983. A poor man's spelling verify program. Creative Computing 9,6 (Jun):229-36.

This article lists several parts of a modest spelling checker program and explains its rationale and implementation. It is listed in this article and coded in Microsoft Extended Disk Basic.

Arms, Valerie. 1983. Creating and recreating. College Composition and Communication (October) 34, 3:355-358.

This article describes two of the author's programs for prewriting and for global revision, respectively titled CREATE and ReCREATE. Of the former, Arms says "CREATE asks twenty questions that I might ask a student in a pre-writing conference," (p. 355) and then provides a transcript of the questions and responses. ReCREATE asks ten questions that prompt students to reread critically their papers. These programs are purely prompting devices designed to "teach the patterns of thinking that good writers use without prompting." (p. 355) They assess length of response, but not quality of input.

The author rejects the possibility that handing out the same questions on a sheet of paper would accomplish the same results: "Writing on the computer is enticing; writing on a sheet of paper is not." (p. 356) The author has observed that students seem to enjoy using her programs to stimulate invention. "Most students treat the computer as a friend. They are comfortable talking to it and are awed by its responses. They may argue with a teacher that 'everyone knows' what that fuzzy word means, but they do not argue with the computer, which responds to a short answer with 'Tell me more.'"

Several guidelines for creation of similar materials are given. Essentially, such programs must be easy to use, friendly in tone, and simply worded. Students must be free not only to use the programs at their convenience, but to skip over irrelevant questions and to exit quickly whenever they feel they have solved their problem. The author also recommends the program end with the suggestion that the student write "anything that comes to mind, start your paper, or add comments to yourself regarding your paper." (p. 357) This would of course be incorporated into the resulting printout.

It is stressed in this article that good writing instruction begins in the classroom, not on the computer. There are warnings here against becoming dogmatic in teaching heuristics to students when we really want "to encourage a sense of 'play' with words, sentences, or ideas." (p. 357) We are also cautioned to teach process in such a way that students will not rely on the computer, but will use what they have learned to carry on even if the computer is down. We are reminded that "it is the process, not the computer, that we value." (p. 357)

Baldwin, Mark Lewis. 1983. Where are we headed? A program to calculate the limits to growth. Creative Computing 9,5 (May):200-14.

This article explores constraints on continued exponential population growth, as per Forrester's MIT model. Accordingly, the program considers factors such as natural resources, capital investment, pollution, the ratio between capital and agricultural investment, available food, crowding, and standard of living to calculate population at given times. The program plots to an Epson MX-80 printer. Parameters must be varied within the program (but this could be altered to allow external input). The program listing which accompanies the article is coded in Atari Basic.

Balsam, Howard S. 1983. The Apocalypse equations. Creative Computing 9,5 (May):196-9.

Given the number of strategic missles in Soviet and American arsenals and the probability of an accidental launching (all of which can be varied), the program described here gives the probability of nuclear war breaking out; listed and coded in Applesoft Basic.

Bean, John C. 1983. Computerized word processing as an aid to revision. College Composition and Communication 34, 2 (May): 146-148.

John Bean, according to a footnote and to the author's own mention of his discomfort "composing or revising directly at the terminal", is more at home with Shelly and with Renaissance literature than he is with word processing. He nevertheless reports here an "experiment" in which 4 student volunteers were given the opportunity to learn word processing. The article contains testimonials from two of those students. Daiute's fine article, which preceeds this one in this issue of CCC, is much more revealing as to how word processing helps facilitate writing, but this article is further proof that computers are an excellent tool in promoting revision.

Bearden, Donna. 1983. The voice of the turtle: A schoolhouse Apple tutorial: LOGO. Softalk 4, 3 (November): 80-82.

The Voice of the Turtle is an ongoing feature of Softalk, and this is but one of its many installments. This installment discusses non-equilateral triangles. Donna Bearden also has LOGO tutorials in the April, September, and October (1983) issues of Softalk. Installments for March and months prior were written by Jim Muller. Between April and September, there was a short hiatus while the turtle got its act together. If you're interested in LOGO, these tutorials are a very together act.

Breininger, Lynn J., and Stephen Portch. 1983. A visit to Professor Cram: Attractive computer learning. College Composition and Communication (October) 34, 3:358-361.

This article describes a program, called CRAM, for "Computer Ready to Assist Memory", designed to do just as it says: help students learn rules governing agreement, sentence fragments, comma splices, and run-on sentences. Since the authors disclose at the outset that they wrote this program "to take full advantage of the current computer craze," it is not surprising that they have transformed a "well-tested" text-oriented mode of instruction to a technology capable of more progressive presentation than the tutorial/drill format described here.

However, the authors are pleased with their results. The sentences in their exercises are indeed interesting, having been borrowed from Guinness Book of Records and The Book of Lists (example: "Both Atilla the Hun and Pope Leo VII were reported to have died during sex.") The authors also make some use of the gamesmanship inherent in their computer. In sum, they think Professor Cram adds "a positive component to our overall writing program by generating student interest -- and even enthusiasm -- for learning those often troublesome rules. Before Cram's creation, we had either to expend precious classroom time teaching these rules, or to assign relevant chapters in a workbook. With the former, we suspect that a lot of time was consumed explaining rules already mastered by many in the classroom; with the latter, we suspect that many a page went unread." (p. 360) One wonders whether the text on the screen of the lessons described here will really be read any more closely.

Bridwell, Lillian, Paula Reed Nancarrow, and Donald Ross. 1983. The writing process and the writing machine: Current research on word processors relevant to the teaching of compositon. In Beach, R., and L. Bridwell (Eds.) New directions in composition research. New York: Guilford Press. pp. 381-398.

According to Schwartz and Bridwell (1984:73), this article "Evaluates current research and specific programs useful for college-level writing, reviews work in progress in compositon classrooms, and assesses implications for the future."

Chapelle, Carol, and Joan Jamieson. 1983. Using informative feedback messages in CALL courseware. TESOL Newsletter 17,4 (August):26-27.

The article begins by developing the premise that, although immediate remedial feedback is one of the strongest rationales for using CALL in the first place, current offerings in CALL courseware are virtually devoid of such feedback. This oversight fails to properly utilize the computer's potential, which is to not only identify incorrect responses, but to "recognize to some extent what is wrong with them." (p. 27) Although "intelligent" answer judging techniques exist, most teachers will rely on the more simple technique of "error anticipation", and this technique is explained here. The first step is an analysis and cataloging of errors students are likely to make, and the next step is to develop an algorithm that will enable an appropriate response to students who make any of the anticipated errors. Examples of such an error analysis and remedial algorithm are given for a lesson on past tense verbs. The result is a program which "enables the student to receive the maximum number of relevant feedback messages using a minimum amount of computer space for the program."

Chapelle, Carol, and Joan Jamieson. 1983. Recognition of student input in computer-assisted language learning. CALICO Journal (December) 1, 3:7-9;16.

In this article, possibile modes of student input to a computer are outlined. Considerations involved in computer recognition of this input are characterized with specific reference to PLATO and the TUTOR programming language and to word search (Pusack, 1983) and parsing programs (Markosian and Ager, 1983). Finally, possible actions that could then be taken by the computer in response to student input are considered.

This article is written at a broadly conceptual level. Furthermore, it is directed particularly at those with an interest in PLATO and its TUTOR language. However, it touches all the appropriate bases and would serve as a useful primer for those interested in a general outline of what possibilities for student input exist and what action the computer could be expected to take as a result of that input.

Collier, Richard M. 1983. 'The word processor and revision strategies. College Composition and Communication 34, 2 (May): 149-155.

Inexperienced writers typically (1) do not deal adequately with "larger domains of text" (p. 149), (2) do not "juggle successfully the demands placed on short- and long-term memory" (p. 150), (3) do not attempt to retrieve text once it has been changed, and (4) keep changes in text to a minimum to facilitate recopying. Collier assumes that word processing will help writers to overcome these problems and so devises a pilot study in which four operations (addition, deletion, substitution, and reordering) are studied within 6 domains (punctuation, words, phrases/clauses, T-units, idea clusters, and paragraphs). His hypothesis is that word processing "would significantly expand the number and the complexity of the operations used by inexperienced writers when revising and would increase the range of domains upon which these operations were performed." (p. 150)

Unfortunately, the experiment used only 4 non-randomly selected subjects: one weak, two average, and one superior writer. Before the experiment, the writers had only two sessions in which to familiarize themselves with what appears to be an overly sophisticated text editor (the word processor is not named in this article; however, Collier notes several of its limitations). Collier says he had his subjects prepare handwritten first drafts in all cases; some of these were revised by hand, and some were revised using the text editor. Later he says that some first drafts were entered directly into the computer, but that there was no advantage to this except that "revising <was> somewhat more efficient." (p. 152)

The hypothesis was supported in that "the number and complexity of operations employed for revision increased," (p. 151) and that writing within the smaller domains was enhanced. In addition, it is noted that essay length "increased slightly" due to additions, that the writers revised even their revisions, that the strongest writer seemed to benefit the most (and weakest least) from the project, and that 3 of the 4 subjects "reacted positively" to the text editor.

On the other hand, some of the data support the efficacy of revision by hand. For example, "serious and elaborate additions" to essays were made more when writing by hand, "surface structure errors" were more frequently missed when using the text editor, and the larger domains were manipulated best by hand. This latter finding was probably due to the text editor's not allowing students to easily page through their writing; it encouraged them to focus instead on the fragment appearing on the screen. Hence, these 4 subjects tended to make more revisions than they would have normally by hand, but these were "sometimes minimal, often trivial, and occasionally detrimental. Editing in the smaller domains does not seem to add much to the effectiveness or quality of the final product." (p. 153)

In spite of this conclusion, Collier generously reports that "not all is gloomy" for word processing. "Revisions accomplished on the word processor were never worse than those done in the traditional format" (p. 153) and were in some cases modestly improved over work by hand. Furthermore, "revising on the word processor was by and large quicker and more extensive." (p. 154) This in itself is a positive finding, and one which may have led to more holistic revision had the students ever become comfortable with the software they were using. Collier ends this article by suggesting numerous improvements to that software which would help students achieve a more holistic revision. (See Pufahl, 1984, for a response and Collier's rebuttal.)

Crichton, Michael. 1983. Predicting the future. Creative Computing 9,3 (Mar):188-202.

This program will allow users to cast coins, either physically or via the program's random number generation, after which it generates hexagrams and their titles and numbers (and prints this information out if desired). Users must then consult a translation of the Book of Changes for an interpretation of the output. The program listed here is coded in an unnamed dialect of Basic.

Daiute, Colette. 1983. The computer as stylus and audience. College Composition and Communication 34, 2 (May): 134-145.

This article provides an analysis of the psycholinguistics of the composing process and shows how word processing computers can help overcome the physical and psychological constraints inherent in that process.

Physical constraints: writing and revising is "slow and sometimes painful". Writers are hesitant to revise because the result may be messy, or may contain new errors. Also, writer's block results from the view that, once committed to paper, words are permanent; writers are thus reluctant to risk that commitment. Word processors, however, assist in overcoming these problems by alleviating writer's cramp, giving words a more transient quality, facilitating cutting and pasting, and allowing writers time for rereading instead of recopying. Also, automatic formatting gives writers constant pride in their work and lets them more easily judge a piece as a whole. Most importantly, a word processor "encourages writers to experiment and to view their writing as dynamic." In dynamic writing, revision can be done in stages, one stage for content, one for organization, one for spelling, transition, etc.

Psychological constraints: in writing, one must supply contextual and interactive clues commonly provided by a partner in speaking. Many writers lack the objectivity necessary for viewing their own work to see where these clues are necessary. Also, in grappling with syntactic and logical considerations, many writers can't empty short-term memory before it fades to long-term. Practiced writers may have developed strategies for replenishing short-term memory from long-term or by focusing on different steps of the writing process one at a time; one of the deferred steps being taking the reader's point of view. Prompting, either from a teacher or from peers, seems to toggle long-term memory into feeding short-term. Even automatic prompting will remind writers of the reader and cause them to fill in gaps in their prose. Good writers eventually learn to prompt themselves.

According to Daiute, "The computer can help overcome psychological constraints on writers, because the computer can temporarily relieve some burdens on short-term memory." (pp. 140-1) This is because it is physically faster to compose at the keyboard. "In addition, the computer seems like an audience, thus stimulating the writer to take a reader's point of view. (p. 141) In this respect "The text editor is subtly interactive ... calling the user's attention to tasks it has completed and by waiting for subsequent commands. ... This invitation reminds the writer that the program is waiting to receive input, which encourages the writer to say more and to consider whether what is written makes sense." (p. 141) The computer can also facilitate electronic exchange of writing, further heightening an awareness of audience.

Finally, the computer "encourages writers to control their own cognitive processes because it makes them more conscious of them." For example, the computer's demand for precision forces students to make a habit of self-monitoring. Additionally, error correction programs parallel conversational supports while leaving the option to repair under control of the author. They also guide the writer into stepwise revision, build the writer's confidence, and help the writer adjust to the concept of collaborative writing.

In summary, computers give writers greater control over and greater fluency in their writing. They take much of the tedium out of writing, letting the writer's energy be utilized for more concentrated writing and for more focused revision. Because word processed writing is so easily changed, "The computer has proved to be a destroyer of writing blocks." Furthermore, "much of the resistance to finding one's own mistakes disappears ... The text editor capacities make it easier for students to act on their own intuitions about their writing." (p. 143)

Davison, Ned J. 1983. An interactive concordance program for the small computer. CALICO Journal 1,1 (Jun):24-6.

The program listed and described here will run concordances, providing statistical information on location, frequency, and percentage of occurance of words in a given text. Coded in Atari Basic, the program will access properly formatted Atari text files.

English, Randall. 1983. Problems in paradise: We will be disappointed with the computer. Electronic Education 2, 5: 24,38.

After noting that failure of computers to accomplish 100% of people's expectations will breed disappointment, Randall sets up various criticisms of CAI as straw figures which he shoots down with parenthetically delivered facts. The straw men are the misconceptions that computers are in-humane, that computers depart from "the basics", that computers are 'frills' that do not warrant their expense, and that computers will replace teachers.

Still, English points out that lack of quality software is one of the most serious problems in CAI implementation. Reasons for this lack are that the primary language used for software, BASIC, is not as well developed as the computers it is run on, that non-educators still dominate the educational software business, and that talented software developers find game and business programming more financially rewarding than they do educational programming. English thinks that the formation of teams composed of people with expertise in programming, education, and design would put educational software development on the right track.

A second problem with CAI development is the inadequacy of training programs for educational staff wishing to upgrade skills or acquire initial skills in CAI. English implies that such training should be centralized, and not left to individual institutions which are themselves confused about what to do about educational software development.

Fitzgerald, Brian. 1983. The amazing maze Part 3-D. Softline 2,3 (Jan):14-9.

This article describes how to plot and negotiate the maze in question. There is a listing in S-C Assembler, plus an Applesoft loading program.

Fitzgerald, Brian. 1983. The amazing maze in 3-D Part IV. Softline 2,4 (Mar):14-7.

This article describes how to plot and negotiate the maze in question. It includes a listing in Atari Basic with Applesoft patches.

Fitzgerald, Brian. 1983. The amazing maze in 3-D Part V. Softline 2,4 (May-Jun):14-7. (Two issues have same issue no. 4.)

This article describes how to plot and negotiate the maze in question. The listing is in Atari Basic with Applesoft patches.

Gabel, David. 1983. What's in a game? Personal Computing 7,4 (Apr):63-9,172.

This article provides a discussion of the potential value of computer games.

Higgins, John. 1983. Can computers teach? CALICO Journal 1, 2: 4-6.

This article begins by characterizing two roll models of teachers: magister and pedagogue. The former is iron-handed and judgemental while the latter is a slave who follows his master, ready with information on demand. The magister model, according to Higgins, was partly responsible for the failure of language labs. In CAI, the magister emerges from programmed instruction, and has resulted in page-turner CAI. Higgins suggests that the pedagogue role is therefore the most appropriate for the computer, and in the remainder of the article, he produces a litany of suggestions for making the computer a slave of the learner by emphasizing the "general advantage that the computer may have over class learning or any form of magisterial teaching, letting the learner participate in decisions about how he or she will learn." (p. 5)

For example, the computer can process text through deletion, insertion, substitution, and re-ordering; therefore, the learner can, for instance, ask the properly programmed computer to create a cloze exercise from a pre-supplied text, in which every nth word is deleted, according to student specifications. Or students could ask the computer to give them a re-ordering exercise based on the same (or a different) text, as in a strip story. In any case, the ability of the computer to process text gives the learner numerous options for approaching a set of teacher-supplied texts.

Three interesting programs, CLOSE-UP, TEXTBAG, and STORYBOARD, stress prediction as a teachable skill. Another programming concept, GRAMMARLAND, "creates a miniature universe, within which it has all the relevant knowledge to ask and answer questions, to obey instructions or even to learn new facts which are compatible with its elementary structures." (p. 6) In GRAMMARLAND, "The learners' task is simply to find out what the machine can do, and they can set about it in any way that they like," (p. 6) including pressing the ENTER key and watching the computer question itself. This and other adventure games "lend themselves especially well to group exploitation rather than individual use." (p. 6)

In closing, Higgins returns to the question in the title: can computers teach? His answer is that, "When used to teach like a magister, computers have beeen successful only in very limited ways, with well-motivated students using them for specific short-term goals. Otherwise they have failed." (p. 6). But as pedagogues, computers "can enrich and diversify <existing> resources, providing new and exciting ways of increasing the learners' exposure to meaningful language." And furthermore, this can be done with "the smallest and cheapest machines," in preference to larger and more imposing mainframes.

Higgins, John. 1983. The computer as a communicative environment. TESOL Newsletter 17 (December), 6:9.

This is essentially a distillation of points the author has made elsewhere; specifically, in the article cited above, and in his book with Tim Johns (1984). Starting from the premise that "human beings have much less talent at 'being taught' than they do at 'learning'", Higgins suggests that the computer's lack of intelligence can be best exploited by learners who use it to help them experiment with the language, in order "to put the trial back into trial-and-error." For example, the computer can be used to "demonstrate" language; that is, to churn out randomly selected examples of a particular linguistic feature. Higgins employs this principle in "Grammarland", wherein the computer demonstrates an interaction with itself which the learner can then attempt to emulate. The computer can also be used in an "exploratory" mode, where the learner tries out the effect of various inputs, ultimately to BOOH the computer (make the computer do something foolish). Finally, the computer can act as a "game-setter" or "game-board", allowing students to exercise language in play. All of these activities "lend themselves well to small group exploitation, where the discussion that goes on round the screen is part of the learning process. ... In this sense, at least, computers can be described as communicative."

Howe II, Harold. 1983. Computers: The new kick in the schools. College Board Review 128, Summer: 24-32.

Harold Howe II is a self-professed computer illiterate who seeks, in writing this article, to provide a perspective on how computers are, and should be, impacting schools. His remarks rely heavily on analogies between television and education and on his reading about computers in schools. To his credit, he anticipates areas where his analogy with TV does not hold, while from his reading, he brings numerous statistics to bear on his argument, which is that there are mainly political reasons why educators are not doing enough to make use of this potentially powerful tool in education.

What he has observed with TV leads Howe to speculate, among other things, that (1) "Television so pervaded society that the schools never really had a chance to choose their options in regard to it. They were invaded by home-based TV. The same thing may happen with computers." (p. 26) Furthermore, (2) "The experience with TV suggests that schools and school districts flirting with the use of computers must make plans for new opportunities for staff training and must provide the funds to make those opportunities a reality." (p. 26)

Howe sees one crucial difference between computers and TV: "Computers offer a technology in which students are active participants from the beginning, whereas most TV programming leaves the student in a passive mode. In this sense, computers are more sound educationally." (p. 26) In addition, combining TV with computing, as in a videodisc configuration, will compound the advantages of both.

Not wholly optimistic about the prospects of computers to revolutionize education ("the school as an institution has a massive capacity to resist change" -- p. 26), Howe notes several inroads that computers have made already. Besides already cropping up at schools, computers are becoming cheaper, more user friendly, and hence more practical in education. Also, familiarity with computers is acknowledged to be necessary in this day and age, and "they offer major possibilities for encouraging new levels of thinking and problem solving among children, so that the computer is a learning tool with vast untapped potentialities. The computer as a tool for learning, as opposed to the computer as drillmaster, is of great significance." (p. 26)

However, as with every major hardware innovation (e.g. video, language labs), there have been problems with software. Most software to date has been written in short, disconnected modules, produced haphazardly by people more interested in market conditions than in educational environments. Furthermore, it is boring and repetitious and not clearly tied to other activities or textbooks. Crucially, "Very little of the available programming takes full advantage of the computer's capacity to lead a student into problem solving and other more imaginative tasks." (p. 28)

Government funding is vitally necessary for making significant inroads with the software problem, but the Dept. of Education (under Bell) has proposed only $16 million for a three year program of software development, or 13 cents a year for each student in the country. The current trend, by which educational computing projects are undertaken by the private sector (e.g. Walt Disney, Sesame Place), will result in computers being everywhere but schools, and used by everyone but the poor. This will create problems and inequities that government should try to head off with a greater commitment to educational computing.

Jaeger, Bruce. 1983. Cavern Quest: An adventure game for the Bally Arcade and Commodore Vic 20. Creative Computing 9,7 (Jul):222-5.

Players go into a cave to retrieve hidden treasure. Because of memory constraints, joystick input replaces "Go North", "Up", etc. (but can be replaced with a more elaborate text analyzer/parser on larger machines, see Please Parse the Zork, or many of Ken Rose's articles in Softline, 1982-3, for simple examples of such parsers). The suggested solution for this game is: make a map (a good language learning activity). Cave configuration varies randomly; items in cave include a boot, skeleton, shovel, mildewed saddlebags, bats, etc. Listings are given for Bally and for Vic 20 & PET/CBM, plus modifications are given for Vic or Pet without joystick.

Joy, B.K, and A-P. Lian. 1983. The butcher, the baker, the candlestick maker: Some uses of dialogue generators in computer assisted foreign language learning. Australian Review of Applied Linguistics 6, 2:60-71.

Beginning with the premise that CAL, with its emphasis on "discrete point syntactic features of language", is in danger of rejection from language teachers, the authors feel that "CAL can and will be adapted to accommodate more communicative programmes involving more experiential, global and interactive aspects of language and that dialoque generators could have a central importance within such programmes." (p. 60)

The dialogue generator described here draws on a database of utterances and on rules of discourse to generate plausible and infinitely varying dialogues. The article suggests numerous ways that such a facility could be used to promote a sense of natural language in both structural and communicative language courses (for example, in creating exercises where the computer takes one part of the dialogue, or in having students respond to prompts like 'The butcher asks what you want'). The article is largely speculative, especially in discussing how voice digitalizers and videodisc interfaces can be used to enhance all this, but is on solid ground in suggesting imaginitive paradigms by which computers can be utilized outside those normally considered by language teachers.

Kearsley, B. Hunter, and R. J. Seidel. 1983. Two decades of computer based instruction projects: What have we learned? T.H.E. Journal

(Technical Horizons in Education) 10, 3: 90-93.

This review of over 50 CAI projects is a good starter article for the serious researcher in CAI, in part because of the 102-item bibliography printed in the margins. The authors divide the field into work with prototypes, conceptual demonstrations, major implementations and evaluations, dissemination, authoring systems, intelligent CAI, innovative environments, and new theory. Projects falling under each of these categories are identified in a table, but elaboration in prose is carried out in this issue only for the first two categories: prototypes and conceptual demonstrations. The article was due to continue in a future issue of T.H.E.; however, this reviewer is not aware that this was done.

The first section discusses prototype systems such as PLATO and TICCIT, and mentions that no CBI project has since departed from these original concepts except for videodisc systems and SMALLTALK and ICAI, which have mouse-controlled cursor, concurrent processing, etc. In the next section, projects are discussed in which computers were "used as a tool of the student ... <as> reactions or alternatives to the original philosophy of CAI in which computers were used to deliver instruction." (p. 93)

The authors draw nine conclusions from their survey. These are (1) "computers can make instruction more efficent or effective." (2-3) Little is known about individualized instruction, or about the effects of graphics, speech, motion, or humor in CAI. (4) Strides have been made in overcoming inertia and resistance to change. (5) CBI authoring tools and techniques have been well developed. (6) "Good mechanisms have been developed for the dissemination of CBI ideas and courseware." (7) "CBI has spurred research throughout the entire field of instruction." (8) Federal funding is "pivotal". And (9) "We have just scratched the surface of what can be accomplished with computers in education." (p. 90)

Kennedy, Patricia H. 1983. Selecting computer software for a high school English course. English Journal (November) 72, 7:91-92.

This short article is useful for its practical advice and information. The author counsels that in choosing software, one should (among other things) (1) peruse software reviews for indications of user friendliness and good documentation, (2) consider instructional modes other than drill (e.g. games, problem solving, word processing), (3) look for software that allows users to edit data or alter programming, (4) "select software that gives intrinsic rewards through the use of a motivating and an entertaining format," (p. 91) and (5) tend toward software that will run from memory, without disk access, so that it can be loaded into several computers at once. Some word processors and three instructional programs useful in secondary level English classes are mentioned. Of these, only Magic Spells (from Apple Computer) appears to be useful to foreign language instructors, having an edit mode and 25 page manual.

Kennedy, Robert E., and Curtis N. Cooper. 1983. Crossword puzzle pattern generator. Creative Computing 9,9 (Sep):252-256.

The program described here generates a 15 X 15 square crossword grid, at least 25% black. It gives you the option of creating the pattern or letting the computer do it. The program is listed and coded in North Star Basic.

Kimmel, Stephen. 1983. World Builder: A modest program for designing strange new worlds. Creative Computing 9,6 (Jun):262-77.

This program, which allows users to create plausible but fictional worlds, "has possibilities for use as an educational science program" (p. 262), and perhaps could be used to stimulate conversation or debate in an ESL or FL class. First, users must settle on a star, the size & temperature of the proposed planet, gravity, orbital eccentricity, tilt of axis, number of moons, etc. The program listing is followed by a sample run which is probably too complex for most ESL students (but which can of course be altered). The listing is in TRS-80 Basic.

Kotler, Lorne, and Kamala Anandam. 1983. A partnership of teacher and computer in teaching writing. College Composition and Communication (October) 34, 3:361-367.

This article describes the RSVP (Response System with Variable Prescriptions) system developed at Miami-Dade Community College with a grant from the Exxon Education Foundation. The RSVP system is not interactive, but is a computer-based teachers' aid whose purpose is to assist teachers in composing letters to students providing feedback on compositions the teachers have read and graded. The guiding principle is that students make predictable mistakes in writing, that these can be broken down and classified, and that responding to these student mistakes is simply a matter of the teacher identifying which mistakes each student has made and instructing the computer to respond accordingly. This provides consistent and complete feedback to the student and saves the teacher the time and trouble of providing extensive feedback to each student on a paper by paper basis.

After reading a given composition, the instructor designates it as falling into one of four categories governing the level (based on a Fry readability count) at which the computer will respond to the student. The instructor then bubbles a form on which are written all the errors anticipated by the system, and which is used to instruct the computer to find text segments corresponding to the appropriate mistakes. These text segments explain the mistake to the student and give a model (at the appropriate level) illustrating correctly executed writing. The computer compiles the segments of text corresponding to each mistake into an individualized letter given in turn to each student. Students use the letters to critique future writing, as a basis for student teacher conferences, and as a record of their progress in writing over the school term. (See Withey, 1983, for an unfavorable critique of RSVP.)

Kowsary, Roya. 1983. Buenos dias, senor computer. This World (a San

Francisco newspaper), Oct. 2: 17.

This newspaper article reports on the work of John Underwood, assistant professor of Hispanic studies at Mills College, who has created a conversational Spanish language program "as a pilot effort to change the traditional role of the computer in language teaching." Based on the programming principles inherent in Eliza, the mock psychotherapist developed by J. Weizenbaum of MIT in 1966, Underwood's program creates "the appearance of understanding derived from the clever use of key words." Called La Famille, the program "converses", in Spanish, with the student about members of his or her family. Although Underwood is still working to debug his program, he expects to "see serious attempts at developing truly interactive programs within the next year or so."

Lian, A-P. 1983. Using scanners in the computer-assisted development of the writing skill in a foreign language. In Proceedings of the Conference on Computer-Aided Learning in Tertiary Education (CALITE), Brisbane:446-455.

At the outset, the author characterizes two main approaches to CALL: (1) the artificial intelligence approach, involving simulations and knowledge-based systems, and which correspond closely to communicative language theory (i.e. Council of Europe); and (2) the discrete point approach, involving drill and practice and random access generators. The latter approach, while being more conveniently implemented on computer than the former, does not necessarily translate into communicative language activity, which derives more from "a meaning-oriented approach to to the problem of negotiating one's communication needs." (p. 447) As a means of promoting hypothesis formation with a relatively easily implemented system, the author discusses here the potential of computers to facilitate written discourse in a foreign language (French).

Writing is a skill in which students often struggle with meaning at the expense of form, and to which they can rarely apply many of the monitoring skills available to native speakers. Therefore, a computer-assisted support structure is postulated which would allow fluency in writing, provide immediate feedback in a simple, yet quick and efficient way, be individualised, promote an awareness of likely problem areas, and suggest where mistakes might lurk, leaving it to the student to decide if in fact a mistake existed. An example of such a system is SCAN, implemented on Apple, which as soon as the student has entered a full stop scans the sentence for certain keywords (suggested by error analysis). Once a keyword is highlighted, students are led by means of an appropriate heuristic to determine for themselves if the word is used correctly. "By unfailingly flagging each keyword, it is hypothesised that the computer should gradually sensitise students to the fact certain keywords in their target language productions should trigger certain checking mechanisms." (p. 452)

Lian points out two problems with this approach: that students can become easily overwhelmed by the number of problematic keywords, and that students can come to rely on the computer to pick out the keywords for them. Therefore, there should be programmed into the computer a weaning process by which support is gradually withdrawn from students who have used the system a certain number of times. Lian is careful to point out that, far from being in danger of being replaced, teachers will probably have to work harder to monitor the data generated in order to better help each student.

Lian, Andrew, and Christine Mestre. 1983. Toward genuine individualisation in language course development. Australian Review of Applied Linguistics 6, 2:1-19.

This article discusses in some detail a theory of individualisation pursuant to showing how an elaborate student-controlled simulation (a "macrosimulation") can be used to deal effectively with non-homogeneous classes. The macrosimulation described here is one in which students settled on a setting for their language learning, an imaginary village in France, and then defined the topography and architecture of the village and assumed roles and characteristics of villagers. It is suggested that individualisation lends itself to facilitation by technological innovations in teaching, but also that it creates problems in that "the notion of a 'course' as a fixed set of knowledge and experiences with everyone doing the same thing, at the same time, at the same rate and in the same place must be abandoned." (p. 13) The authors suggest self-accessed open entry-open exit as a means of implementing individualization while satisfying the notion of a course acceptable to institutes of higher learning.

Marcus, Stephen. 1983. Real-time gadgets with feedback; Special effects in computer-assisted instruction. The Writing Instructor (Summer) 2, 4:156-164.

This article is full of imaginative suggestions for using computers in writing instruction. A sampling:

(1) Practicing freewriting by turning down the brightness on the video monitor so that composing is literally done blind -- This assuages the obstruction of fluency and dilution of concentration that accompanies frequent editing of language, syntax, and mechanics when writing normally. "Invisible writing with computers discouraged the kind of "local editing" that is particularly common with word processors and that is counter-productive at certain stages of the composing process. It encouraged a quality of attention to the topic at hand which is sometimes lacking in usual freewriting activities." (p. 157)

(2) First line/last line -- Students run a program which gives them "two apparently unrelated sentences, for example:

> He checked his schedule to see what he planned to ruin today. They left him wondering whether the door would close in time.

The directions are to move the cursor between the sentences and to type in a story which connects them. As the writers do, they see the second (i.e. final) sentence creep to the right, snaking down the screen as they continue typing." With such exercises, "words are not fixed and rigid. Expression has shape and movement -- literally and figuratively." (p. 158) This is supposed to be good for overcoming writer's block.

(3) Conferencing -- In hopes of turning up the inner composing voice (a la Emig, Perl, etc) and of utilizing it in a dialog whereby ideas are constantly generated and brought to the surface, Marcus and colleagues place student A's video monitor atop B's terminal, and B's atop A's, both cocked so that A can see B's terminal but not his own, and vice versa. Student A writes while B prompts or suggests. Later, printouts allow reconstruction of the dialog for further collaboration. "This kind of activity utilizes the advantages of freewriting and invisible writing, and adds to them the benefits of training students to be careful readers, paraphrasers, and writing consultants." (p. 159) Furthermore, this "maintains in a very definite way the social dimension of the composing process and the sense of audience. It also provides a temporary antidote to the isolation some people feel when working with computers." (p. 160)

(4) Global search and replace (SAR) -- Text can be typed into a text editor and, using SAR, can be processed (by, say, replacing vowels with symbols and numbers) so that it appears to be garbage. Students must reconstruct the text, again using SAR. Alternatively, students can use SAR to change a passage from first to third person.

One reason that these activities work so well, according to Marcus, is that computerized text is intrinsically motivating. "There are indications that print which appears on televison screens is neither print, per se, nor television. Rather, it is print-on-televison: a new medium with its own characteristic messages." (p. 162) This unique medium, "videotext", is helping teachers and students to "shape a new environment even as they are being shaped by it." (p. 163)

Mead, William. 1983. A Course in C.A.L.L. for an M.A. program in ESL. TESOL Newsletter 17,5 (October):13.

In this article, Bill Mead elaborates on components of a course he teaches at the University of Houston, where students have a choice of using BASIC or LISP on the university mainframe. These components, in order of historical development and increasing individualization of instruction, are:

(1) Successive frame -- Originally conceived by Pressy (1926), this program type presents frames of text information and related questions to be mastered in sequence.

(2) Scrambled textbook -- Introduced by Crowder (in Coulson, 1962), differs from 'successive frame' in that incorrect answers result in (ideally) branches to explanatory sub-lessons

(3) Adaptive teaching programs -- Suggested in Golberg, 1973, this type of program branches not according to one response, but to a history of responses.

(4) Learner controlled programs -- These programs suggest that the learner take action appropriate to a history of responses. Examples given are TICCIT programs and The Writer's Workbench (in which suggestions are inferred from analysis).

(5) Artificially intelligent tutoring systems -- This type of program combines natural language processing with student modeling; that is, such programs can judge an answer for correctness based on AI processing, and they can "learn" from students so as to evolve a means of more accurately processing answers.

McConnell, Barry. 1983. Timex's novice-friendly keyboard gets high points. Electronic Education 2, 6: 30-32.

Those present at the 1983 TESOL Convention in Toronto and who saw the impressive examples of CALL programming done on Sinclairs might be interested in reading this review of that $99 computer. Although constrained by the fact that the keyboard is "not a typist's", the programmer will find the keyboard versatile enough for his own purposes and will appreciate professional touches such as immediate interpretation of program syntax. At the end of the article, half a dozen books on Sinclair programming are either lauded or panned. The reviewer rates the Sinclair as an excellent beginner's computer that is also expandable for even greater versatility. At its price, and especially considering the potential suggested for CALL at the recent convention, the Sinclair should not be overlooked by CALL/CAI lesson authors.

Mimlitch, Thomas R. 1983. Adventures in WPL. Softalk 4, 3 (November): 131-144.

This article is about how 12-year old children are motivated to construct their own interactive stories on computer using Apple Writer and WPL, the Word Processing Language which comes with Apple Writer II. In so doing, the kids practice typing, exercise their creativity, and make decisions based on their reading comprehension. "Soon they're expanding on outlined ideas and expressing themselves in sentences -- writing, editing, and rewriting story frames. And the thought that peers will be reading their stories encourages youngsters to strive for correct grammar and spelling and clear meaning." (p. 131)

The project described in this article involved 6 kids over a period of 5 months. The kids created their own adventure stories in which there were numerous opportunities for branching. The stories were constructed in frames, so that readers could exercise options of what frame would come next and thus create a story of his or her own choosing. The frames and possible story lines were first worked out on individual cards and pasted to a wall, but eventually these were entered into Apple Writer files. WPL was then invoked to handle the branching functions and allow authors to set up stories and readers to recreate them according to individual fancy.

The author reports that this was an exciting and gratifying experience for the kids. But unlike many articles which describe such projects superficially and in glowing terms, this article provides enough technical detail to enable others with Apple Writer II to conduct the same experiment. Program listings in WPL are given, as is the text of one of the stories produced by the children. This article is therefore a thorough description of how the computer can be successfully turned into a tool for the facilitation of creative learning.

Otto, Sue K., and James P. Pusack. 1983. Stringing us along: Programming for foreign language CAI. CALICO Journal 1,2 (Sep):26-33,47.

This article presents a comprehensive discussion of string handling, and contains listings of subroutines (in an unspecified dialect of Basic) which do certain tricks.

Pinho, Fred. 1983. Medieval combat. Creative Computing 9,5 (May):230-8.

Two opponents assemble cavalry, archers, and infantry and try to maneuver their respective forces to overwhelm the enemy. In so doing, the opponents attempt to attract defectors from neutral kingdoms and/or the other side, to survive natural disasters, and finally to obliterate the enemy. A program listing is provided, coded in Atari Basic.

Putnam, Constance E. Foreign language instructional technology: The state of the art. CALICO Journal (June) 1, 1:35-41.

The author attended numerous computer-related presentations at several professional gatherings in 1982, and this article is a coalescence of her thinking about what transpired at those presentations. She sees much potential in CALL, when linked to sound pedagogical practices, but she also cautions against pitfalls exposed at some of the presentations. Throughout the article, it is stressed that in CALL development, "we should exercise caution, pay close attention to the special needs of foreign-language education, and concentrate on making programs and materials as widely usable and transportable as possible." (p. 36)

Caution -- Caution is advised in the suggestion that language teachers, who "have a history of jumping on passing bandwagons," might, with CALL, become stranded at the end of the ride as they were with language labs. Not that language teachers should be wary of experimenting with computers, but they should "acknowledge that technological developments have far outstripped pedagogical insights." Therefore, we should not "try to utilize the latest technology without testing our pedagogical assumptions first ..." (p. 36)

Special needs of FL education -- "One as-yet-largely-overlooked area of concern is figuring out the ways in which the processes of learning or teaching foreign languages make the use of computers peculiarly relevant. ... Specialists need to look more closely at the possibility of a significant connection between the artificial 'languages' needed to program computers and the natural languages we seek to teach. ... At the very least, we should be unwilling to make do with second-hand authoring languages developed initially for other disciplines, which do not really fit our needs." (p. 36) "One excellent example of the sort of specialization we do need is James

Pusack's DASHER." (p. 37)

Widely useable and transportable materials -- Observing that many CALL projects involve resources or contexts not commonly found in FL situations, Putnam presents her concept of "transportability". According to her: "The problem with presentations that <present clever but highly specific programs> is that these people rarely have hard data to show the effectiveness of what they have done. (That students 'seem' to like it or 'apparently' have fun is insufficient evidence of pedagogical validity.) Worse yet, such programs and materials typically lack altogether the critical feature of transportability. What works in one setting may be impressive, entertaining, or instructive -- or even all three -- but if it cannot be replicated elsewhere with little or no adaptation, its value is greatly diminished." (p. 37) Transportability can be enhanced by utilizing Pusack's design criteria for FL CAI. Apart from suggesting "flexible and adaptable" pedagogical strategies, Pusack counsels avoiding assumptions about users, allowing deletable and otherwise alterable features and sequences, avoiding language specificity, and including numerous options in CALL.

This last point is especially important. An option, "as long as it does not violate our pedagogical principles, should be included. If we do not make such options available, we end up locking ourselves into the rigidity of book format, and fail to take adequate advantage of the technology. ... Technology can enable us -- if we use it appropriately -- to escape the traditional lockstep of the print media and most current methodology." (p. 38) This leads to two challenges for educators. "The first is recognizing ... that computers really do represent an altogether new medium. To date there has been a pervasive failure to grasp that novelty ..." The second challenge is "to be able to state our educational goals clearly. Only if we have evaluated with precision and care what we want and need to teach and how best to achieve our objectives is there any hope that we can make appropriate and effective use of new media." (p. 38) Using videodisc development as her example, Putnam illustrates how "We have to modify our methods to match the medium." (p. 39)

In the final section of her article, Putnam relates FL pedagogy to CALL. The discussion leads to games, of which Putnam is skeptical. The motivation of computer games is "unlikely to work on a long-term basis. Even in the short run, we are about to face a generation of students who know far more about computers than we do, and who have had far more experience with highly sophisticated games than the ones we are thrusting in front of them. ... What we present to our students must be of pedagogical value and not merely entertaining... " (p. 40) Also mentioned as potentially significant to CALL are voice recognition and simulation. There is even a speculation about the role of computer-generated translation in the teaching of foreign languages.

Noting that Mark Seng, at the University of Texas at Austin, has compiled a 100-title list of articles on CAI, Putnam observes that "Staying abreast of the literature ... is clearly impossible. Such lists, if properly updated, would have to change frequently and rapidly." (p. 35) The listing you are reading now is augmented as frequently as time will permit (if not "rapidly"). It is by no means comprehensive, but it is at least an effort in the direction suggested by Putnam.

Root, Jock. 1983. The schoolhouse Apple. Softalk 3, 11 (July): 107-109.

Beginning with this issue, Jock Root takes over the Schoolhouse Apple column from Jean Varven. This installment reviews the state-of-the-art in quality educational software. Noting that there has been a dearth of good educational software, Root says that "excellent teaching programs are now available". To be good, the software must be entertaining as well as educational, and to be entertaining, it must be "challenging, involving, reasonable, varied, and fast." (p. 107)

Several programs teaching math and language arts are reviewed as examples of quality software. One six-pack of vocabulary skills lessons from Arcademic Skill Builders "has one important drawback -- no provision is made for adding your own list of problem words to any of the programs." (p. 108). This aggravating and typical oversight on the part of software developers plagues the educational software market. Therefore, the only software package of interest to second and foreign language instructors in this review is Word Attack! (Davidson & Associates), which combines drill and practice and arcade instructional formats with the capacity to create one's own vocabulary data base. Root gives this package high marks for aesthetics.

Root, Jock. 1983. Dungeon Fun Part 1: He was going to hit me, so I hit him back first. Softline 2,5 (Jul-Aug):14-8.

The program described here implements combat within a confined space, and is designed to hook up with the maze part of the program presented in the next installment of this series. The listing is in Applesoft Basic.

Root, Jock. 1983. Dungeon Fun Level Two: All dressed up and someplace to go. Softline 2,6 (Sep-Oct):22-6.

The program described here "will let you guide a character through a maze, telling you what he sees at each step." (p. 22) The listing is in Applesoft Basic.

Rose, Ken. 1983. Adventures in adventuring: Basically, another adventure. Softline 2,3 (Jan):22-7.

This adventure illustrates parsing techniques and contrasts these in Atari and Applesoft Basic. A listing is provided with coding in Atari Basic with Applesoft patches.

Rose, Ken. 1983. Adventures in adventuring: Challenge of the adventure writers guild. Softline 2,4 (Mar):28-9.

The author is proud that he has created an adventure in only 43 lines; listing provided in Applesoft Basic with Atari patches.

Rose, Ken. 1983. Adventures in adventuring: Return of the Teddy. Softline 2,5 (Jul-Aug):8-12.

This article describes a program for a game in which words have double meanings, and in which the order in which things are done is critical; listing provided in Applesoft Basic.

Rousselle, John R. 1983. Purega: A management decision game. Creative Computing 9,10 (Oct):272-281.

The program described here, which allows players to manage a 200 seat restaurant, is in use by several college hospitality education programs around the country. Players hire and train employees, allocate funds for preventive maintenance, advertising, and promotion, and/or lose money because of bad will. In this game, "the basic concepts are simple enough to be understood by anyone" (p. 272). The author points out that although there is no random factor built in, one could easily be inserted. The program is listed; coded in Basic-Plus to run on a DEC RSTS-E system.

Rowe, A. Allen. 1983. CEGOLLE: A new kind of language learning. Creative Computing 9, 4: 190-200.

Major Rowe, who is with the U.S. Air Force Academy, leads off his article with the observation that "Computers compute quite well but they haven't met with much success in computer assisted instruction (CAI)." Noting that the "great tide of CAI enthusiasm, which crested in the early seventies" is experiencing a resurgence as "young educators" are attracted to microcomputers, Rowe says "It is time for those of us who remember the first CAI fiasco to throw our full weight of experience and seniority into the defense of our unsuspecting junior colleagues who, like ourselves before, are ready to waste a good portion of their young lives and possibly gamble away their academic credibility on this CAI renaissance." Rowe then reveals that it is not the computer that caused the problem, but the concepts "assisted" and "instruction". He then explains why "computer enhanced learning" would be a better acronym, and proceeds to develop his arguments from this revised perspective.

Rowe's perspective is based on a number of assumptions which will probably be controversial to humanistically inclined language instructors. One such assumption is that the student is an "adversary" whom the educator must "trick" into learning by clouding the distinction between work and play. In Rowe's view, students who prefer books to movies or TV are in the minority, and we should therefore capitalize on the proclivities of the majority by arranging educational media accordingly. Since learning must be structured, structured play (i.e. a game) is in order. (At this point it is revealed that CEGOLLE is an acronym for Computer Enhanced Game Optimized Language Learning Experience.)

Rowe is likely to ruffle feathers over other issues. For example, there is the statement that computers are "more reliable, consistent, and much less expensive" than human teachers. Rowe suggests that, although it probably won't happen in our lifetime, when "machines acquire human level competence in communication <then> anyone who objects to the use of computers for fear they could replace him may well be right ..." (p. 192, 194).

Rowe also draws a comparison between computers and language labs, a comparison that most computer advocates would either avoid or make only to stress how such a comparison is for the most part invalid. Rowe, mentioning only the few points where tape-enhanced and computer-enhanced learning do coincide, notes that language labs have been useful but misused (see also Underwood, 1984). Thus he concludes that in the case of both technologies, "the hardware must be simple and robust and the troops in the trenches, not just the local field marshalls, must want it. For software, there must be two options: efficient authoring systems for the do-it-yourselfers and quality off-the-shelf packages for everybody else. Easier said than done." (p. 194) Citing a certain rather ridiculous solution to the software vacuum resulting from an NSF grant, Rowe suggests that a marriage between industry and academe would be more sensible and appropriate.

Now comes the good part: Rowe paints a truly compelling scenario of what learning French at your star wars command console must be like. Although his ideas may seem to verge on science fiction, they are certainly practical given the state of the art today, and an example of the kind of creative thinking that must precede good software development. Perhaps, from Rowe's example, there is yet room for the military at the industrial-academic interface that he suggests.

Rumelhart, David E., and Donald A. Norman. 1983 (June). Representation in memory. San Diego: California University, Center for Human Information Processing. ED 235 770.

According to the ERIC abstract, "This paper reviews work on the representation of knowledge from within psychology and artificial intelligence."

Schug, Peter. 1983. Animated hi-res sailboat. Creative Computing 9,7(Jul):206-19.

This program illustrates concepts inherent in sailing by showing "a two-dimensional animated graphic hi-res simulation of a displacement hull with a trimmable sail and steerable rudder" (p. 206) The rudder and sail are controlled with game paddles, and toggles can be made between boat mode and vector diagram mode. "Between the information in the legend and the image of the boat moving across the screen, you can get a fair idea of how a boat sails." (p. 208). The program listing is coded in Applesoft Basic.

Shur, Paul. 1983. 'Boob tube' saves face. Electronic Education 2, 6: 13-14.

Those interested in the current status of videotex in the United States might be interested in this article (and see also Urrows & Urrows, 1982). Mention is made of a videotex center at the University of Florida's College of Journalism, making that institution "the first school in the country to break ground in this new technology." (p. 13) At the end of the article, other projects just getting off the ground are discussed, as are prospects for the videotex industry in America. (France, UK, and Canada have several years' head start on the U.S. in videotex; school children in France even use the electronic mail capabilities of videotex to trade answers on homework assignments.)

Shur notes that "The ability of the viewer to respond to questions posed on the videotex screen opens the door to educational possibilities. The benefits of Computer Assisted Instruction (CAI) can then be accessed through the home television -- giving homes the benefits of CAI without the expense of buying a computer." (p. 14) Another educational use of videotex is in audiovisual instruction. Although the learner is normally passive in this mode, videotex may allow the programs to be partially interactive by pausing occasionally and asking questions, the answers to which are revealed at the press of a button. "With this method, even broadcast teletext may become interactive -- requiring the viewer to pay attention and to think about the content presented." (p. 14)

Soemarmo, Marmo. 1983. Programming for misspelled extended input. CALICO Journal 1,3 (Dec):31-9.

This article discusses 3 programs that use different means of providing students with informative feedback. According to the abstract "LIM-LEN MISSPELL indicates the length of the expected input and disallows the inputting of a longer string. Feedback is in the form of reproducing the correct part of the input. Reinputting must be done by retyping the answer." RESPELL simplifies reinput "by allowing students to screen copy the correct portion of the input." MISSPELLING tells "whether the input is (a) one letter short, (b) contains one misspelled letter, (c) contains two letters in reversed order, or (d) contains the correct rootstem but the form is incorrect, with an indication of whether the students should check the prefix, suffix, or both. In addition to the standard maximization of user friendliness and crash prevention, all three allow extended input. Input that contains commas, quotations, colons, etc. will not result in ?EXTRA IGNORED messages." Program listings are coded in Applesoft Basic; plus, soft copies are available from the author.

Standiford, Sally N., Kathleen Jaycox, and Anne Auten. 1983. Computers in the English classroom: A primer for teachers. Urbana: NCTE.

According to the write-up on p. 100 of the November, 1983, English Journal: "This booklet explains in as non-technical a way as possible what a computer is, how it works, and how it might be used to enhance instruction in the English classroom." Its four chapters "introduce the basic facts about computers and their capabilities, detail instructional methods now available via the computer, relate applications to curriculum, and offer resources for evaluating both hardware and software."

Steely, D. 1983. Instructional design and CAI. In D.O. Harper and J.H. Stewart (Eds.), Run: Computer education. Monterey, CA: Brooks/Cole. pp. 126-128.

According to Schloss et al. (1984:103) this "comprehensive review of available literature" suggests that future research into CAI be directed into more complex issues than hitherto, e.g. "identifying the most effective computer assisted instruction strategies, qualitative and quantitative aspects of feedback, and approaches for learner interaction."

Steffin, Sherwin. 1983. Thinking a program. Softline 2, 4: 21.

This page-long article discusses the design of drill and practice programs. Aimed at beginners in CAI, it touches briefly on various aspects of content selection and presentation, learner response, confirmation and reinforcement, and management in CAI.

Stevens, Vance. 1983. Review of English lessons on PLATO. TESOL Quarterly 17, 2: 293-300.

This article reviews the grammar component of the ESL lessons created for PLATO by the IEI at the University of Illinois. In noting the strengths and weaknesses of these lessons, software developers might discover principles which can be applied to their own products. The article also relates these lessons to issues in CAI/CALL. For example, the point is made that lack of software appropriate to this medium of instruction is crucially needed in CAI. Therefore, much mention is made of what criteria should be applied in considering software to be appropriate. "The wider question is one of choice and control in CAI. Is it best to harness the computer as part of a carefully managed programmed learning scheme, or do greatest benefits result from allowing students the freedom to explore (or not to explore) the medium as they like?" (pp. 296-297) The PLATO lessons in question somewhat constrain the students in their exploration of the medium and in possibilities for communication in English. These lessons are a major contribution to the field, even if they suffer to some degree from "close association with textbooks, the amount of typing required in student input, occasionally inappropriate feedback, some inattention to function as opposed to form, a high degree of control over student progress, and lack of exploitation of potential options for students." (p. 299)

Stevens, Vance. 1983. A report of a project illustrating the feasibility of video/computer interface for use in ESL. CALICO Journal 1, 1: 27-30, 50.

This article describes a project entailing interface of an Apple

II with a Sony VCR, using a Gentech controller card and software. In developing a demonstration ESL listening comprehension lesson, the authoring software accompanying the Gentech device was found in many respects to be lacking, but this did not thwart the project. A rationale for interactive video is discussed in this article, as are differences in implementation between video tape and videodisc configurations. The most detrimental aspects of using video tape rather than videodisc are the prolonged access time inherent in the linear medium, and a momentum factor in the tape carriage that rendered the tape counter increasingly inaccurate and eventually put the tape out of synch with the controlling program. However, VCR was the only medium available to the researcher, and for economic reasons, a project of this scope could have been undertaken at all with videodisc.

Stowbridge, Marc D. and Peter Kugel. 1983. Learning to learn by learning to play. Creative Computing 9 , 4: 180-188.

This article is about work done by the authors in training students to learn how to learn by discovering problem solving strategies first for computer games, and then for computer programming. Thus the article concerns how computer heuristics can be enlisted to give students strategies for coping with learning tasks. There is also a message here for those who would embed learning situations into game formats.

Earl Stevick, in his book Teaching and Learning Languages (1982, Cambridge University Press), states that "The quality of the learning that takes place when we focus our attention only on the items to be learned is different from (and probably inferior to) the quality of learning that is incidental to something else that we are trying to do. That principle applies to all language games ..." (pp. 131-2) Although Stevick is not alluded to in this article per se, his philosophy is echoed, for example, in the four fundamental principles of this research (p. 183); that is, that students "learn by thinking about what they are doing when they try to learn", that this is accomplished by doing rather than by discussing theory, that games provide an appropriate mode for this kind of discovery, and that what is gained in this process is transferable to other subjects when attention is paid to the transfer process.

The elements inherent in games cited here are also similar to those cited by Stevick. Stevick mentions that games begin from something that all players have in common, that they all have set rules, that players have control over options within the framework of the game, and that the game has a goal. Stowbridge and Kugel point out that the computer is an excellent medium for games because it is strict, yet non threatening in applying rules, because the player is the only person with control over the game, and because the computer can play tirelessly and on demand. The authors also point out that students are relaxed when playing games and readily assign them value, whereas they may not assign value to abstract concepts taught in a classroom.

The authors found that the best instructional strategy was to simply turn the students loose on the games. Thus, students were forced to learn the rules and strategies applicable to any given game.

In this way, students were forced to develop their own approach to problem-solving situations. The authors summarize the advantage of this as follows: "some students resist learning in school because they feel it violates their personal integrity to do what the teacher tells them to do. They feel they are giving in. Such students do better when allowed to use their own strategies. Furthermore, students understand better things they have framed in terms of their own intuitions than what has been framed in the intuitions of others. One of the great merits of using computer games in this situation is that the computer will reward any approach that works. It need not be the approach that the programmer or the teacher had in mind when the game was presented. And this gives the student a feeling of confidence in himself." (p. 184; see Stevens, 1984, CALICO Journal, for an incident illustrating this point)

Stowbridge and Kugel found that at first, students "seemed to lack flexibility in their approach to problems. They would try one way to solve the problem and it would never occur to them to try a different one." (p. 186 -- See Scollan & Scollan, 1982, for how strategies vary as to age.) Eventually, a general three-step strategy emerged, and this was to (1) gather data and compare them with previous knowledge, (2) list options, and (3) try out each option in turn, either on the computer, on paper, or in the head. If an option seemed promising but inadequate, it would have to be debugged.

Finally, the authors attempted to facilitate transfer of what was learned about learning into some applicable activity. The obvious choice for this activity was computer programming. Beyond that, the authors say, "We do not know whether the ideas learned by playing games also transferred to their other courses. But we have some fragmentary evidence that suggests that, at least in some cases, it did ... but we cannot be sure." (p. 188)

Although this article deals specifically with teaching students how to learn, there is obviously direct application of the findings to CAI authors who would like to work in a game format. Also, encouraging students to learn a subject (especially one such as math, but possibly ESL) by teaching them how to program CAI for that subject is sometimes a viable suggestion, and this article sheds light on that possibility.

Varven, Jean. 1983. The schoolhouse Apple. Softalk 3, 5: 228-235.

Jean Varvin writes a monthly column on computers in education. These columns are full of information about educational computing conferences, publications, and software. This installment consists mainly of Jim Muller's LOGO tutorial on tesselations. Included are several program listings in LOGO. Later, the Schoolhouse Apple column was taken over by Jock Root, and the LOGO tutorial was being done by Donna Bearden. At this time (1985), Softalk has ceased publication.

Wall, Elizabeth S. 1983. Using the computer in the classroom; a review. Electronic Education 2, 5: 23.

This is a review of a book dealing in training teachers in instructional computing, published in 1982 by the User Services

Department of the Minnesota Educational Computing Consortium. The book contains materials for a fifteen hour course in instructional computing. Topics include computer operation, courseware evaluation, incorporating CAI into a lesson, and how computers work. Notes for instructors and course and workshop material for students such as outlines, handouts, and transparency masters are included with the book. Versions are available for Apple and Atari.

Whereas the reviewer seems enthusiastic about the potential of this book used in a course in which the pupils are teachers who have access to a computer lab, she does not comment on the value of the book for someone who might want to glance through it on his or her own. Nevertheless, the existence of such a book will obviously make CAI more accessible to teachers who are privileged to use it.

Wall, Elizabeth S. 1983. Microcomputers for adult learning, David G. Gueulette (Ed.), Follett Publishing Co., Chicago; a review. Electronic Education 2, 6: 33-34.

According to the reviewer, this book addresses both the perils and potential of CAI in adult learning, and suggests models for its implementation. The book contains 11 articles, some of which review the development of various aspects of CAI since the 1950's, relate theories of learning to the use of micros, or discuss the role of micros in medical management, reading, and writing. One article deals with perceptions of administrators toward computers, another with attitudes presenting barriers to widespread implementation, and others with the impact of telecommunication networks on learning. There are also articles listing information and software resources for CAI, and detailing the fundamentals of microcomputer hardware and software.

White, Mary Alice. 1983. Synthesis of research on electronic learning. Educational Leadership 40, 8: 13-15.

This article raises questions about computer-assisted learning and answers them based on research reported in about a dozen source articles. The questions and their answers (in a nutshell) are: "Do computers help learning?" Yes, students learn more quickly and can muster the motivation and attention necessary for learning through drill and practice on computer. "Doesn't elcectonic learning take away from reading?" Yes, but students may learn more in spite of limitations in the medium. "Do computers motivate pupils to learn? There are no systematic studies so far," (p. 13) but yes. Will computer games affect learning?" Yes, so we will "have to take games much more into our thinking in organizing instruction." (p. 14) "What is so attractive about interactive technology? ... the idea of a challenge, the involvement of fantasy, and the game format." Students using computers tend to be more alert and inquiring than usual. "What about this technology itself attracts pupils?" Speculation is that it's the element of control students have, that it's the interaction, or even the glamor of the new technology that is so appealing. "Does learning a computer language help other learning?" As of yet, we don't know. "What kind of pupil does best at learning a computer language?" (p. 15) People who are good at math and science, and at "a certain type of linear thinking" are best at that. "Don't computers isolate children socially?" Definitely not. "At present we are seeing increased socialization around the computer. And the level of socialization around the computer is greater than in the classroom." "Why isn't there good software?" First of all, too much software has tried to emulate print, and this hasn't worked. Second, it may be that software that has been evaluated poorly is in fact effective with students. Also, the software, as poor as it is, continues to draw students, and "at the moment, even bad software seems to be capable of teaching." "What can the computer technology really do?" For one thing, "children will be learning more from graphics than they will from the alphabet." Finally, "What will the new technology bring?" The possibilities inherent in videodisc interfaced with computers assure that striking changes in education will occur.

Withey, Margaret M. 1983. The computer and writing. English Journal (November) 72, 7:24-31.

According to Withey, there are two conditions "changing the way English teachers will teach writing." One is the process approach to writing, and the other is discoveries concerning the way computers facilitate writing. This article deals with the latter topic more philosophically than informatively, but there are some insights.

Four approches to CAI are mentioned: (1) programs which tutor discrete skills and in which students are either right or wrong (i.e. most existing software), (2) programs which engage students actively in more open ended dialog (e.g. Burns and Culp, 1980), (3) cases in which the student programs the computer (e.g. Papert's LOGO), and (4) cases in which the computer is a blank work area (i.e. word processing).

The author thinks that all approaches are worthy of consideration, but regarding the first, she notes that "Teachers must decide whether there is any place for programs that fragment writing. All spelling, vocabulary, and usage programs fragment. Having seen in their own teaching that pre-teaching usage has little carryover to writing and having heard that studies bear out their observations, teachers of writing must question whether they should use the computer to further compound the grammar and usage problem. (p. 25) ... The computer's infinite patience and persistence is already known; its effectiveness in correcting errors is not." (p. 26)

Withey takes several existing CAI implementations to task for pedagogically poor programming, notably citing misuse of TICCIT and PLATO. She is not much kinder with RSVP (see Kotler and Anandam, 1983), which prints comments to students on their writing according to marks their teacher has made on a form. Citing studies of RSVP in which no significant differences were found between experimental and control groups, Withey writes, "Teachers of writing have long suspected that writing notes in margins was ineffective. Computer-generated messages are not likely to be more effective. Again the pedagogical problem remains. Using the computer to teach pointless lessons faster than ever before does not produce better writing." (p. 27)

Noting that "A computer program based on a good human model has more potential for success than a program based on poor teaching

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techniques or trivial goals," (p. 27) the author introduces as an example of the former the programming of Burn and Culp (1980). "Most teachers know that if they analyzed their own teaching they could discover the questions, promptings, and orders they give repeatedly." (p. 27) Programs incorporating this kind of dialog, then are desirable, but not entirely without fault. "The Burns-Culp program raises another pedagogical problem. Students study their teachers and learn quickly what to expect and how to respond. Human teachers, however, are always a little unpredictable. Computers are machines. When students have discovered what the machine does in stimulating writing, they may be less ready to respond to the stimulus. They may be better able, on the other hand, to proceed as independent learners, having gained from the machine what the machine had to offer." (p. 28)

Withey touches only lightly on the third type of CAI, that which the student programs. She notes that LOGO might become the language of choice for English teachers in the future, not (as Loritz, 1984, points out) because the structure of LOGO is compatible with natural languages, but because children learn it, and it is therefore easier to use than is BASIC.

The remainder of the article deals with word processing, and here an interesting point is raised: given the existence of programs which automatically check spelling and usage, will it still be necessary to extensively drill these items? Withey sees an analogy between such programs and calculators in math class, which have made extensive practice in elementary math functions unnecessary -- and undesirable, considering that more time could then be devoted to higher order math. "Is it not preferable to let the computer correct mechanical errors and let the students concentrate on production of copy, organization, and the investigative and cognitive skills required by the process? The computer may be the coup de grace for teaching grammar apart from writing." (p. 30)

Wyatt, David H. 1983. Computer-assisted language learning comes of age. TESOL Newsletter 17, 3: 9.

Interest in CALL in TESOL is growing, especially since the 1983 TESOL Convention in Toronto (and see page 13 of this TESOL Newsletter for a report on the formation of a CALL Interest Section in TESOL). In response to this interest, Dave Wyatt notes how computers can assist in the skill areas of reading/vocabulary, writing, grammar, listening/speaking, and testing. In reading, for example, the computer would be particularly suited to a "reading skills" approach. The ability of the computer to process words makes it a useful tool in writing. As far as grammar is concerned, heavy emphasis in courseware developed along structuralist lines is not appealing to many language instructors, although there is no reason why other approaches could not be adopted. Listening skills could be best developed with computers configured for interactive video. Testing using computers is especially appealing because of the computer's ability to "adapt interactively to the ability of the student during the testing process." Of all these skill areas, Wyatt finds that only speaking shows little promise with computers. In conclusion, he points out that while the problem of quantity in software may be somewhat ameliorated during the next year, the problem of quality may remain for some time to come.

Wyatt, David H. 1983. Three major approaches to developing computer-assisted language learning materials for microcomputers. CALICO Journal (September) 1, 2:34-38.

The three approaches to CALL development are (1) general purpose programming languages, (2) educational programming languages, and (3) educational authoring systems. This article explains the differences between these systems and the trade-offs involved in selecting either of the three options. In addition, specific examples of each option are discussed and reviewed, making this article valuable reading for experienced users of CAI, as well as for those contemplating their first efforts at CAI programming.

General purpose programming languages -- BASIC is the system of choice. "It has been estimated that 80% of the software to date has been written in BASIC ..." (p. 35) Reasons for this include the fact that BASIC allows intimate control by the programmer over all phases of programming and that a version of BASIC usually accompanies all types of microcomputers. On the other hand, the programmer must first learn to use the general purpose language and then devote a lot of time to implementing, step by step, the intimate control available to him. Additionally, a programmer must become experienced before producing courseware which is reasonably sophisticated.

Finally, there is with BASIC a "lack of convenient commands" (p.35) for education. Examples of such commands would be delay commands and, particularly, answer processing commands. Fortunately, subroutines developed in solving such problems are usable in later programs. "Producing the higher-level answer processing features is a major undertaking, however, and BASIC is in any case not suitable for the final form of such routines because of technical reasons (for one thing, it runs too slowly)." (p. 35) In any case, remedies for some of these drawbacks are available commercially; for example, with MECC's collection of subroutines for Apple II, and with En-BASIC, which provides "excellent high-level answer processing capability." (p. 36)

Educational programming languages (of which PILOT and En-BASIC are examples) -- PILOT allows one-command implementations of routines which would be much more complex in BASIC. It also allows the programmer to easily take advantage of features particular to a given microcomputer; for example graphics and sound for Apple (a general-purpose programmer could purchase utilities which would allow him or her to do the same thing). One version of PILOT for Apple even allows touch screen capabilities. En-BASIC is sophisticated especially in answer processing, allowing even a "second-chance" mode for answer editing. A further advantage of educational programming languages is that "programming time will be less than in general-purpose languages, but will nevertheless be of the same order of magnitude." (p. 36) Furthermore, there is also a savings in time needed to learn the system, as opposed to general-purpose languages.

Wyatt notes several drawbacks to these special languages, namely a limited set of commands, limited memory for textual content (leading in PILOT to delays caused by frequent disk access, a problem which "has apparently been much reduced or entirely eliminated in recent versions of PILOT for microcomputers" - p. 37), inadequacies in character set generation for diacritics in foreign languages, and the implied bias toward drill-and-practice noted by Merrill (1982). However, Wyatt notes that "Most of these drawbacks are theoretically avoidable", and that En-BASIC "does not seem to suffer from any of these problems." (p. 37)

Educational authoring systems -- These prompt lesson authors for lesson components and require no programming. They can be learned quickly and "can also greatly accelerate the speed of development of courseware." (p. 37) One such system, AIDS, results in highly professional screen presentations which are "rather gratifying to the novice user, as even the first attempts appear quite polished when used by students." Another such system, DASHER, is even more appropriate for CALL, since it offers foreign alphabets and "an intelligent answer processing capability which is similar in power to that of En-BASIC. ... The power and convenience of this edit mode makes this feature one of the best of its kind among current microcomputer-based systems and languages." (p. 38) Still another authoring system, PASS, allows videotape and videodisc interface. Yet another trend is toward systems which will generate a very limited but indefinitely reusable type of activity," such as Clozemaster (p. 38). The greatest drawback to authoring systems is that they lend themselves mainly to strongly instructional, but not tutorial (because of limited branching) applications. "However, if it is precisely this type of courseware that is desired they offer a highly cost-effective option that deserves very serious consideration." (p. 38)

---*- 1984 -*---

Avner, A., S. Smith, and P. Tenczar. 1984. CBI authoring tools: Effects on productivity and quality. Journal of Computer-Based Instruction 11,3:85-89.

This article reports research documenting productivity gains and quality improvement with authoring tools.

Baltra, Armando. 1984. An EFL classroom in a mystery house. TESOL Newsletter 18,6 (December):15.

Adventure games are "inherently attractive" to students, allow students to deal with situations not normally found in a school environment, and encourage group dynamics. Mystery House (Williams and Williams, 1980) is an adventure game that differs from others in that it takes place in a venue familiar to all (inside a house) and utilizes common vocabulary (candle, hammer, etc., as opposed to necromancer, conjurer, etc.). Baltra describes here how he utilizes Mystery House in his EFL setting to stimulate group interaction in a problem solving situation. He concludes that while this is a stimulating activity for his students, it is still not the ideal kind of adventure game for ESL. "Getting around in an airport, ordering a meal in a restaurant, finding one's way in a department store, and carrying out a monetary transaction in a bank, to mention some, are activities which truly qualify as adventures for the newcomer in an

English-speaking country."

Bass, George M., and Harvey W. Perkins. 1984. Teaching critical thinking skills with CAI. Electronic Learning 4,2 (October):32,34,96.

This article reports on research in which 7th graders were tested on the effectiveness of using CAI to teach four critical thinking skills, as measured using standardized tests. The four skills, and the programs used to teach them, were (1) verbal analogies (Analogies/Program Design, Inc.; Word Analogies/Sliwa Enterprises), (2) logical reasoning (Rocky's Boots/The Learning Co.; Inference and Prediction/Micro Learningware), (3) inductive/deductive reasoning (Critical Reading/Borg-Warner Educational Systems; Snooper Troops/Spinnaker Software), and (4) word-problem analysis (Problem Solving Strategies/Random House, Inc.).

A "close cohort" design was used as a substitute for truly randomized groups, which would have been impossible to arrange without intruding on education at the experimental site. Subjects had all signed up for a critical skills course as an elective. The experiment compared students in the 3rd quarter experimental group with a control group taking the course in the 4th quarter (the two were considered to be close cohorts); students were assigned to these two groups through the normal school scheduling procedures.

Five sections of the course were taught during each of four quarters, the first two quarters being used for pilot studies. During the third quarter, two of the five sections were taught two of the critical thinking skills using CAI, while the other three sections were taught the other two skills using CAI. "More teacher-directed instruction" was used to teach the remaining two skills in all sections. It is not mentioned in this article what the control treatment was for students taking the course in the fourth quarter.

Results were that the verbal analogies and inductive/deductive reasoning skills were taught more effectively using computers, but that there were no significant differences between groups in the other two skill areas. Differences were attributable either to CAI, to the novelty of the course offered, or to the normal learning growth of the subjects tested. The authors state that, in addition to evidence gained about the effectiveness of CAI in teaching critical thinking skills, they have "tested a workable method for other studies" along the same lines. (p. 32)

Elsewhere in this issue (p. 22), Art Luehrmann discusses the (economic) need for computers to be used to teach critical and problem solving skills.

Behmer, Daniel Edward. 1984. The teacher/pupil/computer partnership in instructional computing. CALICO Journal 1,5 (June):9-11.

In light of educational technologies (radio, television, language labs) that have not achieved their potential in education, educators must ensure that computers are properly integrated into their curricula. However, equipment is already being purchased without any plan for its use. A plan is proposed, ostensibly to help educators utilize computers so that they will meet their potential.

The plan covers all angles, but is generally worded and does not offer much that is new.

Biggie, Louis. 1984. Public domain software. TESOL Newsletter 18,3 (June):11.

Focus on software for ESL seems sometimes to be concentrated on what is available in the commercial sector. Biggie's article is a welcome reminder that there are palatable alternatives to commercial programs, which many regard as unreasonably expensive and pedagogically unsatisfactory.

Public domain programs are alterable and freely available. In addition, adaptation enables the computer-using educator to sharpen programming skills. And, coincidentally, public domain programs usually "depart from the format of drill-and-practice ... and allow the student to enjoy activities which do not simply duplicate what has taken place in the classroom for years." Public domain programs effect this departure by (1) stimulating conversation (insofar as many of them lend themselves to group work); (2) fulfilling specific functional objectives (i.e. agreeing, disagreeing, compromising, etc.); (3) facilitating usage of certain structures (for example, conditionals, 'the more one thing, the more another', etc.), and (4) giving insights into American culture. The article gives several examples of public domain programs which accomplish the foregoing objectives. Sources for public domain programs are also given. (See Stevens, 1985, TESL Reporter, for a more extensive treatment of public domain software.)

Boyden, Patrick. 1984. Computer software copyright. Journal of Computer-Based Instruction 11,4 (Autumn):125-128.

This article examines the implications of the recent (1976) revision of U.S. copyright law for producers of computer software in light of even more recent test cases. The article details numerous specific implications, sample vignets of which are: (1) Legitimate owners of software may copy it for archival purposes. (2) Although programs are in effect copyrighted as soon as they are authored, there are some advantages to registering them by paying $10 and filling out a form. (3) A deficiency in existing law is that "one may take the idea of a BASIC program, along with the logic and the algorithms and write a different BASIC program that does exactly the same thing and copyright it for oneself." (p. 127)

Brown, Steven, George C. Grossman, and Nicola Polson. 1984. Educational software reviews: Where are they? The Computing Teacher 12,1 (August/September):33-37.

This article comprises a comprehensive listing of sources for software reviews. Review journals and reports, educational computing periodicals, education periodicals, newsletters, and other sources of information are cataloged here.

Brownfield, Sally. 1984. Computer-assisted ESL research. CALICO Journal 2,1 (Sep):20-3.

According to its abstract, "This article describes three programs developed to aid ESL students acquire competent reading strategies". One program, based on Frank Smith's (1982) memory experiments, flashes text onto the screen and has students type in as much of the text as they can remember. The second program enforces skimming by having text disappear after 9 to 22 seconds (the exact amount of time being under student control), and asking a single question on comprehension. This program is not listed, but its essential subroutines are given. The third program "emulates the steps that a teacher might follow when giving a timed reading and thus includes several strategies." (p. 21) "The computer, however, is able to limit the students' access to the text, provide immediate feedback, individualize instruction, allow unlimited repetition, and add a game-like quality to the exercise by keeping score and encouraging self-competition." (p. 22) In this latter program, students predict the content of the reading passage from its title and from a single multiple choice question, then skim the text to verify their prediction and change their answer when the text disappears. Next, in this same program, students read more carefully in order to answer comprehension questions, but in a limited time; alternatively, the computer will give them their reading speed if they press the space bar before the text has disappeared. "In anticipation of the text's disappearance, it is hoped they will read quickly, skip over unknown words, and understand the most important ideas in the text." (p. 21) Coded in Applesoft Basic, only the first and second programs are listed, but the author will copy all three onto blank diskettes supplied by readers of her article.

Curtin, Constance, and Stanley Shinall. 1984. Computer-assisted reading lessons. CALICO Journal 1,5 (June):12-16.

The authors are CALL developers who have, from their experience, evolved an enlightened approach to their work. For example, they relate in the course of their definition of "individualization", how they repeatedly altered their courseware so that it gave students control over how lessons were paced, whether missed items were repeated at the end, and whether sound was invoked. Other insights gained from observing students work at the computer are: (1) One advantage to use of computers is that students can be required to type the correct answer, even if this answer is ultimately flashed on the screen for the students to copy (from memory); (2) "Overzealous record keeping" is counterproductive because it obviates the advantage of privacy; (3) Neutrally worded feedback ("Incorrect" as opposed to flip remarks) is sufficient and "does not distract the student by raising the emotive level" (p. 14); (4) HELP sequences should be provided on demand, and are more effective if developed from observation and in consultation with students.

The focus of the article is on the many advantages of CAI over other media of instruction. Several advantages to the students are detailed, including (1) increase in individualization and efficiency in learning, (2) emphasis on feelings of achievement and success, (3) reduction of anxiety, and (4) the addition of a visual dimension in learning (text, graphics, and animation). In addition, there are advantages to the instructor; for example (1) students benefit from all the advantages noted above, (2) time is freed for small group work while the remainder of the class is working with computers, (3) instructors can talk with students individually at terminals while others work productively, (4) "much can be discovered about how students are learning" (p. 14), (5) CAI suggests innovative approaches to teaching, and provides an opportunity for these to be developed and implemented (cf Jorstad 1980, Kulik et al. 1980, Bork 1981, Howe 1981, and Barger 1982), and (6) use of CAI can promote computer literacy in both teachers and students.

This article is interesting in that it presents these tenets not "theoretically", but within a matrix of experiences and examples. As such, this article is valuable reading for those just getting into CAI, and a valid reminder for developers now working in the field.

Davison, Ned J. 1984. From research to elementary language skills. CALICO Journal 2,1 (Sep):14-19.

This article describes a program which can be used to highlight desired verbal patternings (via inverse video on screen, or by printing hardcopy of isolated features only). For example, parallelisms, internal rhymes, thematically analogous words, pronouns, or verb endings or stems could be highlighted as deemed appropriate by teachers, or by the students themselves. The program could also be used to create blank filler exercises or tests. The program works in conjunction with "any" text editor or Atari's DOS COPY command. The program is listed; coded in Atari Basic.

Dunkel, Patricia. 1984. Audio-enhancement of computer-assisted language learning courseware. TEIS Newsletter 1 (Summer), 1:4.

Pat Dunkel here outlines a project in which she is experimenting with interfacing a random access cassette recorder (a Tandberg TCCR-530) with an IBM PC. One result of this will be an intermediate listening comprehension program (for ESL) called Listening Plus (by Dunkel and Lim). Although her work may be accessible only to those with the equipment described here, she points out that "Other courseware developers are investigating applications of the random-access audio disc (using magnetic hard disc speech storage for CALL)."

See also two articles by Rex Last: "A new lease on life for the language laboratory?" in Language Monthly #7, pp. 10-11, and "Teaching your computer to talk" in a forthcoming Modern Languages in Scotland, on interfacing with the TCCR 530.

Dupler, Myrna. 1984. It's not Pac-Man, but it's popular. English Journal 73,3 (March):96-99.

This article gives a listing and explanation of a fairly trivial computer program the author has developed to help students practice spelling. Students at their computers work either alone with a tape player, or with another student (the preferred arrangement, since two students then become involved). A word is read aloud, the student writes the word, and is then told if it is correct or not. The author finds this to be a much improved way of practicing spelling compared with whatever she had been doing before. Although she has no empirical evidence, the author feels that the program has resulted in improved spelling, and that it has surely contributed to improved attitudes toward spelling. Teachers interested in this program can copy it right from this article into their Apples. While not free, the VOCAB spelling games from MECC (on Teacher Utility Two), are also mentioned as being "excellent".

Fisher, Glenn, and LeRoy Finkel. 1984. The computer lab: Where it helps and where it doesn't. Electronic Learning 4,2 (October):52.

In this brief article are discussed the pros and cons of implementing CAI in a computer lab setting, possibly through networked micros. Advantages are that administration is facilitated, and teaching can be "easier if you want all of your students on computers at the same time, and especially if you want them doing the same thing." This may be the case if you are teaching computer science or programming, computer literacy, word processing, typing, or doing "well organized drill-and-practice learning ... provided someone is responsible for the operation of the lab and for tracking the students". Disadvantages include the possibility that a "lab priest" may evolve who restricts access to the lab in his or her absence, or who insists on proper training prior to use. Location can also adversely affect the success of the lab, especially if it is near the math department (as opposed to say, the library), or if it is taken over by hackers who "make tacit territorial claims to the lab". Campus-wide distribution of computers can help overcome that problem. Finally, a centralized lab ignores the fact that "many of the ways in which the computer can excel as a classroom tool do not involve carefully planned use by the entire class for the entire period." The authors conclude that it is ideal to have some centrally located computers and some available for spur of the moment use.

Hartig, Gordon. 1984. Implementing CAI in a university learning center. Journal of Computer-Based Instruction 11,4 (Autumn):113-116.

This article reports on research involving students studying psychology and sociology in a summer university program. The study indicates generally positive effects, and reflects on the efficacy of providing CAI as a voluntary resource for students. However, it should be pointed out that the methodology used is frought with confounding factors; for example, voluntary assignment to treatment and lack of a control group.

Of some interest are the authors insights into previous research. For example, it is pointed out that the results of much research into CAI resulting in no significance or in negative effectiveness "have no doubt often been more a measure of software quality and state-of-the-art equipment than an evaluation of the technology's potential." (p. 113) In addition, researchers in the field frequently "have not had reasonable control over the many variables of implementation." (p. 113) Although the research reported here does not overcome these problems, the findings and conclusions are heartening. (See Stevens, 1984, TESOL Newsletter, Can CAI be evaluated?)

Healey, Deborah. 1984. Free or cheap sources of information and material. TESOL Newsletter 18,4 (August):15.

Many sources of information about educational computing are suggested here; for example, users' groups, modem-based bulletin boards, a good vendor, MECC, computing magazines, newsletters, CALL Courseware books, ERIC, NWREL, and CONDUIT.

Hertz, Robert M. A software evaluation guide for the language arts. 1984. CALICO Journal 1,5 (June):21-23,48.

There is presented here an extensive and comprehensive software evaluation form. On p. 48, references are given directing readers to other sources for software evaluation. Incidentally, CALICO itself maintains (i.e. periodically revises) a software evaluation form which can be inferred through its software reviews section, or which could be obtained from CALICO.

Higgins, John, and Tim Johns. 1984. Computers in language learning. Reading, Mass: Addison-Wesley (Copublished with Collins, Ltd, London, 1983).

This book is about what a computer is and what options are available in language learning (speech synthesis, for example), how computers can be useful in the field of applied linguistics, and about what computers can do in an ESL (or FL) classroom. Higgins and Johns wisely focus mainly on the latter point. In so doing, they stress that the computer's strongest point is not so much its use as a medium for programming instruction, but its ability to stimulate interaction in the target language between students and their peers, and with the computer itself. This book is a fine contribution to CALL because it discusses many ways by which this interaction can be facilitated.

One added bonus to this book is a final chapter divulging secrets of programming Higgins and John's novel brand of CALL. Several program listings are provided and discussed here, and these will provide the programming instructor with some fresh approaches to implementing CALL. Unfortunately, the programs are for a Spectrum/TS2000, a computer unfamiliar to stateside programmers, and which has a dialect of BASIC with several idiosyncratic commands not easily transferable to, say, Applesoft. Still, these program listings, and the many descriptions of programs contained in this book, should provide readers interested in CALL development with concepts and strategies which they can adapt to their own programs; reviewed by Stevens (1985) in CALICO Journal 2,4:41.

Kretschmer, Joseph C. 1984. Teaching BASIC: Why not start with games? The Computing Teacher 12,1 (August/September):24-26.

In my (this bibliographer's) own ESL computer-lab classes, I occasionally teach BASIC programming as a device for stimulating interaction among students. This article describes a technique facilitating this through the medium of word games. Four rather trivial programs are listed: Silly Sentence, Spell-it, Scrambled Word, and Guess the Word. All the programs inculcate principles of programming that will carry over to more advanced language manipulation functions, thus giving students and their teachers ideas for more interesting games. The programs are listed in Applesoft, but hints are given for translation into TRS-80 and PET dialects. Incidentally, some of these hints provide clues for translation of the programs listed in Higgins and Johns (1984) into dialects familiar to American computer users.

Landa, Ruth K. 1984. Creating courseware: A beginner's guide. New York: Harper and Row.

This is a respectably comprehensive book for someone just getting into CAI, as the discussion begins with the topic of computer literacy and a glossary of computer terms, and directs its commentary toward the educator. Chapter 4 is entitled "Focusing from a general idea to a lesson", and this focus is continued in subsequent chapters. For example, one chapter explains how to start conceptualizing CAI on paper, and a chapter on interaction is full of tips geared toward educational programming. A sample guideline found under the heading "Encourage Interaction with Other than the Computer" echos Higgins and Johns (1984): "Interaction with a program need not always exclude the surrounding world." (p. 65) Then come chapters on parts of a lesson: beginnings, endings, test questions, teaching questions, and directions.

Of particular interest to those who wish to utilize the computer in modes other than tutorial or drill and practice is a chapter on "Beyond Lessons," in which the possibility of using games and simulations is explored. This chapter is followed by two more on programming techniques associated with memory conservation and documentation. The final two chapters include exercises which allow readers to practice scripting skills and to study sample lessons.

The book is pitched at the level of the novice, and is thus easy reading for one already working in the field; nevertheless, due to its scope, even persons in the latter category will likely gain something from glancing through this interesting and practical tome. For example, since the book is copiously illustrated with series of screen displays, just looking at the pictures is something akin to viewing a variety of software.

Leuhrmann, Art. 1984. Commentary: How many computers do we really need? Electronic Learning 4,3 (November/December):24.

If you are looking for a perspective on computer proliferation as compared with more familiar proliferations in history, then consider this: The first electric motors were huge and economically feasible only if run constantly and servicing hundreds of people (i.e. in factories). "To speak then of a 'personal electric motor' was to be a dreamer. Now, of course, people have several electric motors in common household devices. So, Leuhrmann concludes that Papert's (1980) idea of a computer for every student may not be so far fetched after all.

Also in this issue is a series of articles on telecommunications: i.e. information services, on-line bibliographic search services, modems, and applications (e.g. Hawaii's Peacesat project). There is also a feature editorial on computers in foreign languages, including an article on p. 52 about two teachers who write their own courseware. Finally, there is an Educational Software Report in which are reviewed The Whatsit Corporation (Sunburst; a bit of business simulation coursware), and Dinosaur Dig (CBS Software/Holt, Rhinehart & Winston; a tutorial full of complicated information on dinosaurs) -- all of which might be of some use in ESL.

Loritz, Don. 1984. Can courseware pass the TOEFL? TESOL Newsletter 18 (April), 2:7.

In this brief but provocative article, Don Loritz examines the potential of LISP-based artificial intelligence in computer-assisted language learning. Noting that computers are currently often used by students for "doing the boring drills they otherwise don't want to do, and we don't want to teach," Loritz speculates that "LISP, however, promises to radically transform drill. In likely LISP-based courseware of the near future, students will be able to create their own dialogues, their own context." AI researchers, who "have more to learn from us than we from them," will not have solved the problem of contextualizing grammar along the notional-functional model, but programs written in LISP are likely to be able to parse sentences and to create more of an appearance of interaction with students than they do now, allowing the students to be creative in the target language.

According to Loritz, "many of the limitations of current CALL courseware are the reflection of our failure to fully exploit such intelligence as computers do possess." Most programming languages, because they are not ideally suited to manipulation of human language, catch linguists on "the horns of a Whorfian dilemma ... Alone among computer languages, LISP (and its step-child, LOGO) is tree-structured, recursively infinite, lexically infinite, and self-transforming. This isomorphism with natural languages escapes the Whorfian dilemma. It has made LISP synonymous with the field of artificial intelligence, and ought to make LISP the programming language of choice for the next generation of CALL courseware." This, concludes Loritz, would help us tap the potential of computers by reversing the acronym of CALL and providing "language-learning assistance for computers. In this work ESL professionals have both a contribution to make and potential dividends to reap."

Luhukay, Joseph R.P. 1984. Computer technology and national development. TESOL Newsletter 18,5 (October):27.

This is a perspective on the computer revolution from the point of view of an academician from Indonesia. The author feels that countries like Indonesia, which have been observers of this revolution but which are only now embarking on programs of technological development, can profit from avoiding the mistakes made in other nations and can "leapfrog" right to fourth generation systems of hardware and software. Furthermore, microcomputers seem to be the right machines for many applications in developing countries.

Marcus, Stephen. 1984. Computers in the curriculum: Writing. Electronic Learning 4,2 (October):54-58.

Marcus mentions three generations of computer-assisted writing tools. The first generation is represented by drill-and-practice oriented programs covering basic skills such as spelling, punctuation, or sentence combining. The second generation is characterized by writer's aids. Research indicates that 85% of a writer's time is devoted to prewriting, only 1% to first draft writing, and 14% to rewriting -- and these modes of the writing process are assisted by prewriting tools, word processors, and text analyzers, respectively. Third generation software differs from the second in that the three components are now integrated, as in Quill (DCH Educational Software/DC Heath & Co., Lexington, MA), WANDAH (Ruth Von Blum, Venice, CA), The Writer's Helper (Conduit, Iowa City, IA), and The Writer's Workshop (Milliken, St. Louis, MO).

Given that "This working model of the writing process is often expanded to include the getting of readers' reactions prior to revision, and the 'publication' of students' writing", Marcus notes the unique capabilities of computers to facilitate the generation, storage, and revision of text, and to allow teachers and students to access (and possibly comment on) work in progress (p. 55). Networking has created an added dimension to the process, as in the case when students in Southern California and Alaska, using The Writer's Assistant in conjunction with a telecommunications system, "have been able to experience the fascination and frustration of making themselves clear." (p. 56; and in EL, May/June 1984, p. 48)

In other approaches to writing, students can use Story Tree (Scholastic Inc.) to create interactive stories (that is, readers can select from possible outcomes), or they can use Puzzle Tanks (Sunburst Communications) to get help in categorizing particular ideas and then to outline them. Finally, students can simply turn down the brightness on their monitors and engage in "invisible writing", which helps them to "resist premature proofreading". In this mode, word processors have "instructional dimensions. They teach students that writing isn't what it used to be: excruciating preparation for tedious revision and retyping. Students see that their words are no longer 'carved in stone.' They are instead written in light, a fluid medium that offers little resistance to physical manipulation." (p. 58)

Elsewhere in this issue, 5 word processor programs and 6 writing programs (including Quill) are reviewed and compared (pp. 60-64). Puzzle Tanks is reviewed on p. 4-ESR, and several other CAI software, devices, and resource items are mentioned and/or reviewed in the pages that follow.

McKee, Macey. 1984. Entering the world of high tech. TTT Review (November):16,20.

In this experiential report, Macey McKee shares insights gained in setting up a microcomputer lab at the WESL Institute; sample insight: "... the computers have not quite taken over the school (just our lives ... whoever started the rumor that computers would put teachers out of work was insane!)" On a more serious note, McKee mentions software she has found to be most effective in her program; e.g. Speed Reader II, Square Pairs, Tic Tac Show, and Trivia Game.

Munro, Allen, Micheal R. Fehling, and Douglas M. Towne. 1984. Instruction intrusiveness in dynamic situation training. Journal of Computer-Based Instruction 12,2 (Spring):50-53.

Previous research shows little or no effect due to student control over CAI when used to teach "knowledge structures". Knowledge structures, defined here as "coherent bodies of essentially propositional information", include multiplication tables, cities in the United States, etc. Typically, such research involves the computer presenting something, the student responding, and the back and forth exchange continuing dependent on the student's responses.

This article reports on an experiment in which prior findings were overturned when "dynamic skill" training was involved. A simulation is an example of this mode, which is characterized by there being no clear cut exchange of turns between student and computer. (The simulation used in this Navy study was based on air-intercept, in which the computer emulated a radar screen.)

The dominant variable in this study regarded feedback, which was either "intrusive" (presented immediately and automatically) or "less-intrusive" (presented when the student was ready for it). It is pointed out that non-intrusive feedback occurs during turn-taking in conversation, when one speaker signals another that he or she wishes to interrupt but does not do so until the other has relinquished the turn. Findings were that less-intrusive feedback resulted in better learning. Similarly, "If the student can control the cognitive processing load by postponing instruction feedback until the processing required by the task is at a low level, then more resources will be available to process the instructional message." (p. 53) However, this stipulation did not apply to joystick manipulation, where the number of errors did not vary significantly between intrusive and less intrusive treatments.

The results suggest that findings based on knowledge system training may not hold for dynamic skill training. They also suggest that immediate feedback may be counter-productive in dynamic skill learning. However, no attempt was made in this experiment to relate what has been discovered about learning a computer-controlled dynamic-skills task to success with an analogous task performed in the real world, where feedback is no longer under control of the student.

Norris, Cathleen M., and Barry Lumsden. 1984. Functional distance and the attitudes of educators toward computers. T.H.E. Journal (Technical Horizons in Education; January) 11, 4:129-132.

This article explores attitudes of educators toward computers, but interestingly, on a differential scale. "Researchers who have explored educator attitudes toward computers have treated attitudes as though they are undifferentiated in nature. In other words, one's attitudes towards computers is treated as a constant whether the attitude being investigated is towards computers for classroom instruction or computers for the storage and retrieval of air travel information." (p. 129)

The authors first establish, through reference to the literature, that cyberphobia, or fear of computers, exists, and that this fear is common among educators. They then cite Bogardus (1925; Social-Distance Scale) and Crespi (n.d.) as having shown the "differentiated nature of attitudes ... when the variable of distance is introduced." (p. 130) They next note that Lichtman (1979) and Zoltan and Chapanis (1982) measured attitudes to computers on a somewhat differentiated scale. Finally, they report the results of their own experiment to determine whether the variable of distance might have a significant effect on educator attitudes toward computers.

A questionnaire containing three statements about computers in education was sent to several hundred educators. The three statements were: (1) "Computers are valuable tools that can be used to improve the quality of education," (2) "Teachers should know how to use computers in their classrooms," and (3) "I would like to have a computer for use in my own classroom." Although a majority of educators agreed with all three statements, the researchers found a significant difference in percentage of educators agreeing with statements (2) and (3). "Educator attitudes seem, therefore, to be positive towards computers as long as the function of the computers is removed from their experiential world of practice. When the suggestion is made that computers for their classroom use are desirable, the proportion of educators expressing agreement drops precipitously." (132) The authors conclude that those planning to implement computers in classrooms should bear in mind that a difference in attitudes can exist with distance, and that this could affect the success of the implementation.

Petersen, Bruce T., Cynthia L. Selfe, and Billie J. Wahlstrom. 1984. Computer-assisted instruction and the writing process: Questions for research and evaluation. College Composition and Communication 35 (February), 1:98-101.

This article is about the effectiveness of software claiming to teach the process of writing, and about features of such software which enhance its effectiveness.

Seven criteria are presented for consideration in examining software designed for use in a process-based writing course. These are: the software should (1) "address specific writing problems, <e.g.> purpose, audience, planning, organization , development, and logic"; (2) "have a true process orientation, <e.g. present>

"heuristics for inventing, focusing, planning, drafting, revising, and editing" (forgoing, p. 98; following, p. 99); (3) be "rhetorically specific", suggesting different rhetorical styles for different contexts; (4) "make students write", not just identify correct writing; (5) "accomodate a range of writing skills and experiences ... on different levels of abstraction or complexity"; (6) involve specialists in both composition and software design"; and be "field tested".

The authors next raise "six major research questions about the software we employ" (this and following quotes, p. 100). These are whether or not the programs (1) "guide students through the composing process"; (2) "provide a useful supplement to classroom instruction"; (3) "offer a practical alternative or complement to tutors"; (4) "affect students' attitudes toward writing"; (5) "are more effective in teaching some rhetorical tasks than others"; and (6) "encourage students to write more."

In this bibliographer's opinion, at least two of these points (numbers 2 and 4, concerning attitudes and supplementing instruction) are valid questions for research. However, the others, as presented here, are controversial. For example, in discussing the first point, Petersen et al. imply that "the computer has inherent limitations that might render processs-based composition programs too simplistic." I would think that such limitations are inherent to programmers, not computers. In point #3, the authors question whether "some students who prefer working with human tutors would show improvement equal to or better than that found with students who worked with the computer and a specific program." In the bibliographer's opinion, the fact that humans can teach better than computers need not be called into question; the question is rather whether computers can be effective when a human tutor is not available. Question #6 asks whether students will brainstorm, explore thoughts, and revise more effectively on computer than they do on paper. In the bibliographer's opinion, the fact that some do is obvious, and the fact that some do not is attributable to preference for a given writing style; consideration of preference and style must therefore dominate research on this subject, and results are not likely to be conclusive (see Hartig 1984 and Stevens, 1984, TESOL Newsletter for thoughts on inconclusiveness of research; and also forthcoming articles by Doughty & Fought and Chapelle & Jamieson on learner-centered CALL).

The article concludes with the suggestion of "four procedures that may help composition teachers begin their efforts in evaluation" (this and following quotes, p. 101). These are (1) "survey the attitudes of teachers and students"; (2) "gather writing samples" from experimental and control groups; (3) "obtain retrospective accounts" of individual experiences with the programs; and (4) "collect protocols" from experimental and control students, both during the experiment, and afterwards to check for duration of effects from the experiment.

Pressman, Israel, and Bruce Rosenbloom. 1984. CAI System costs: Present and future. T.H.E. Journal (Technical Horizons in Education) 11 (March), 6:94-98.

Noting that CAI costs have become increasingly affordable since the 50's, these authors have researched the cost of CAI at present. In so doing, they break costs down into hardware, software, user training, maintenance, and installation.

Taking these categories individually: (1) Hardware -- $500 to $3,000 per unit, depending on capabilities and periferals. (2) Software -- "there has been, in recent years, a dramatic increase in educational and training software" (p. 95), with the burden of its production being spread across book publishers, software houses, manufacturers, etc. The resulting "improved quality and availability of the courseware ... is now becoming a major accelerator for CAI use." (p. 95) (3) Training -- although increased user-friendliness of micros and dealer responsibility ameliorate training costs, users still bear most of the burden of training. (4) Maintenance -- high reliability of micros encourages many to eschew maintenance contracts, which typically run 15% of the cost of the hardware; more problematic is maintenance on periferals, such as printers and disk drives. (5) Installation -- for micros, this is minimal or non-existent.

Taking all this into consideration, the authors price a mini-cluster of 15 micros and one master controller, which apparently were installed in a school with 750-1000 students. They arrive at $17,360 per year for the system (over a 7 year period), which came to $1.32 per student per hour.

In the opinion of this bibliographer, costs were estimated quite high. For example, $7000 per year were allocated to installation and training. Also, unit prices on the computers could easily be half the $32,000 spent in this study, or less, especially as Apple IIe's can now be purchased for under $1000 per unit (and Commodore VIC-20's are $70 each).

The authors point out that trends affecting the price of CAI "are favorable ... These future trends are likely to lower total CAI costs, increase the CAI user base, and create an infrastructure that fosters CAI development." (p. 97) Still, investment in CAI might still be considered "an extravagance ... Yet, if CAI is in reality an effective teaching tool, there could be cost-savings that would tend to offset the expense of such a system;" for example, reduced dropout rates due to "increased student interest and motivation." (p. 98)

Pufahl, John. 1984. Response to Richard M. Collier, "The word processor and revision strategies," CCC, 34 (May 1983), 149-155. College Composition and Communication 35,1 (February):91-93.

Pufahl points out the obvious flaw in Collier's research: that he looked for effective word processed revision techniques using "students who have little or no experience with word processors and who have little or no experience revising ... We should be very surprised if the novice writer, coming upon his first word processor, starts extensive revision." (p. 91)

Pufahl finds four discrepancies in Collier's contention that revision on computer did not "expand the number and complexity" of revisions; i.e. promote global as opposed to local revision: (1) Collier had students write compositions by hand and then enter them on computer; Pufahl suggests that the latter sessions may have been aimed more at producing typed copy than at fostering global revision, as Collier had intended. (2) Students were given only one revision session, and this might have restricted the type of revisions they were willing to undertake. (3) Collier worked on the assumption that global revision followed by attention to detail was (traditionally) the most efficient way of revising, but the reverse might be true using computers, since corrections to detail will be stored and carried over to subsequent drafts; thus more revision sessions might have yielded more positive results regarding global revision. Finally, (4) Collier's lack of intervention in the students' revising processes might have contributed to their attention to local errors; students sometimes do not address global considerations unless such revision is suggested to them.

Pufahl also takes exception to Collier's generalizations on the technology. For example, Collier implies that all word processors are too complex for the needs of students, but he does not mention what kind of word processor he himself was using. Also, Collier thought that the limited amount of text appearing on the screen constrained students to local revision, but did not allow his subjects to counteract that problem by making hard copies of their entire papers. Finally, Pufahl suggests that Collier's focus on the technology of word processing neglects the human element of composition instruction, and it is this element that will render computers in composition either effective or feckless.

In the "reply" that follows Pufahl's "response" (pp. 94-5), Collier asserts that methodological constraints precluded extended revision time and intrusion into the writing process. However, he generously agrees with Pufahl's other points, and draws a distinction between what he has observed in class as opposed to in the "laboratory". Collier's observations in the former setting suggest, for example, that "repeated revising sessions do encourage more comprehensive alterations of text", that intervention does enhance revision, and that "Most students discover, moreover, that they compose and revise best by employing their own hybrid of hand-writing and word processing. Undoubtedly then, a combination of the computer and good teaching yields more extensive language learning than does the computer alone, and investigation of this interrelationship is a direction future research should pursue." (p. 94) Collier also divulges here (and in his larger report, ERIC ED 211 998) what hardware he used in the study; but here, he again fails to specify what word processor was too complex for the task at hand.

Rodrigues, Raymond J. and Dawn Wilson Rodrigues. 1984. Computer-based invention: Its place and potential. College Composition and Communication 35 (February), 1:78-87.

This is an article reviewing programs which endeavor to teach heuristics for invention in writing. Indeed, the authors claim that the computer promises to teach students such heuristics "with more facility than typical classroom instruction allows them to develop." (p. 78) Although this claim is put forth without supporting data, it is argued that the time students could spend with such programs is unlimited, and that "With computer-based invention programs available throughout the day, students could review invention strategies whenever they needed help in generating more ideas -- often at the mid-point of their writing process.

"Besides helping to individualize instruction in invention and to support or assist the recursive use of important activites in writing, computer-based invention may be more effective than traditional ways of teaching invention in still another way: it accommodates differences in student writing styles." (p. 79) This latter claim holds true only if students are allowed to choose from different types of invention programs. The authors thus characterize three types of invention programs, with examples of each:

(1) Invention programs that "guide those students who profit from concrete, sequential learning to produce a preliminary outline of ideas" (p. 79) -- A program by William Wresch asks for a topic and immediately requests a narrower topic. The program then asks the student to choose a perspective on the topic (i.e. history, appearance, causes, job or function). The student must then type in six statements about the topic from the chosen perspective. Finally, the program provides a printout of the student's statements.

(2) Invention programs which, "using formulaic questioning, lead those who need help with an assigned topic to generate and stucture random ideas" (p. 79) -- A program by Helen Schwartz is mentioned, in which the student picks a topic, makes a statement about the topic, provides evidence to show that the statement is true, and finally is asked to consider evidence to the contrary.

(3) Invention programs which "provide open-ended inquiry approaches for those who enjoy generating ideas randomly or even abstractly" (p. 79) -- Hugh Burns's programs employ a variation of "the tagmemic matrix of Young, Becker, and Pike; the pentad of Burke; and the enthymeme and topoi of Aristotle" to encourage students to write down what they already know, and in some cases, what they don't know, about their topics.

The authors go on to describe a program they feel has both combined and augmented principles inherent in the programs already mentioned. Their program uses visual synectics as one of their "Creative problem-solving techniques ... designed to break through linear, focused thinking and to bring forth ideas students might never have thought of by forcing the students to consider their subjects from widely disparate perspectives." (p. 83) In the Rodrigues' program, students must list objects they see in a picture. Then, reverting to a previously selected topic, the program asks students to compare that topic with each word in the list. Finally, the program asks the students to elaborate on each comparison. The point is that "Invention strategies using creative problem-solving, especially in computer-based programs, encourage experimentation, students knowing all the time that most of their ideas will probably be thrown away. The strategies tap non-rational, creative thinking, allowing a playfulness, a fooling around with concepts." (p. 84)

All of these programs can be made to search for "key words in key positions" (p. 83) so that an appropriate response to student input can be drawn randomly from a pool of appropriate responses. Length of input can be assessed, so that the computer can accordingly reward length or probe for more. These programs serve to remind students of heuristics they can use for invention, but as the computer cannot parse input, their use "requires the element of good will and faith." (p. 80)

The authors speculate that the ideal set of prewriting computer programs should be available together as part of a "macro-program" which would allow students to compose in word processor mode, resorting to the menu of invention programs when ready. This would "subtly remind students that invention heuristics can and should be used at any stage of writing," (p. 85) and "both facilitate and encourage recursive invention." (p. 86)

The paper concludes with a call for more research. An interesting example of research cited here is that of Bridwell and Ross (1983), "who are discovering that the effectiveness of word processors as writing tools varies according to the writing styles of those working the word processors." (p. 85) Bridwell and Ross "have the computer tallying keystrokes, timing those strokes, and reproducing the work of the writer stroke for stroke, thereby facilitating specific and detailed protocol analysis." (p. 86)

Roseberry, Robert L. 1984. Two computer programs for the language student. CALICO Journal 1,4 (Mar):20-3.

Two programs are given, a Courseware Authoring Program (CAP), and a flash card program (FLASH). These are listed in Basic for either of two notebook computers, the TRS-80 Model 100 or the NEC 8201.

Schloss, Patrick J., Cynthia N. Schloss, and G. Phillip Cartwright. 1984. Efficacy of four ratios of questions and highlights to text in computer assisted instruction modules. Journal of Computer-Based Instruction 11,4 (Autumn):103-106.

This article reports on a research project in which an attempt was made to discover which format was more effective in tutorial CAI: (a) 90 frames of text, (b) 90 frames of text interspersed with questions, or (c) 90 frames of text interspersed with highlights from that text. An additional variable was the ratio of frames to questions and of frames to highlights (1:1, 3:1, 5:1, and 90:0). Results indicate, not surprisingly, that questions and highlights were superior to straight text, but that ratios of text to either questions or highlights produced no significant differences. Questions were superior to highlights, but only if students were tested using the exact questions used in the computer modules. Affective factors studied indicated that students preferred the highlights to questions, and that they liked highlights in a 1:1 ratio to text frames. On the other hand, the students had the most adverse reaction to questions presented in a 1:1 ratio with text frames.

Implications of this research are that (1) questions and highlights should be used in tutorial CAI as opposed to straight text, (2) questions used should be directed only at the concepts to be retained, (3) highlights produce the most positive attitudes and should therefore be used more heavily than questions (even though questions are more effective), and (4) questions should occur less often than every screen of text.

Schwartz, Helen J., and Lillian S. Bridwell. 1984. A selected bibliography on computers in composition. College Composition and Communication 35,1:71-77.

This 40 some-odd item bibliography would be of great help to anyone interested in how computers can augment the writing process. Included are suggestions for keeping up with developments in the field.

Smith, Kim L. 1984. Using microcomputer word processors for foreign languages. CALICO Journal 1 (March), 4:45-47.

In order for word processors to serve the needs of all foreign languages, they must be able to accomodate foreign language character sets. This article introduces, ScreenWriter II, a word processor for microcomputer (Apple II) which allows the creation of soft character sets. The article also describes programmer aids used in the creation of these character sets, and includes listings of program modifications which will facilitate their implementation.

The author characterizes ScreenWriter II (Sierra On-Line) as a powerful, yet relatively inexpensive ($130), all-purpose word processor. He then describes how he used ANIMATRIX, a program on DOS 3.3 Tool Kit (Apple), to create Russian character sets in a format acceptible, when interfaced with Graphics Writer (Computer Station), to a dot matrix or daisy wheel printer.

The author reports success with and acceptance of his foreign character word processor programs in the Humanities and Linguistics departments at BYU. The only problem seems to be that once the character set is in, then all screen display, including the word processor menu, will be in the foreign character set.

Spurling, Steven. 1984. ANALIT: Item and test analysis and placement. CALICO Journal 1,5 (June):39-40.

The author describes here a test analysis program he has written which accepts either item by item or holistic score entry of test data, and then does item and/or test analyses of the data, along with raw and standardized score placement. The program is flexible in input accepted, and rivals similar mainframe-based programs, even though it is implemented on a microcomputer.

Stahlke, Herbert F.W. 1984. PSC: A probabalistic approach to wrong answer evaluation in CAI. CALICO Journal 1,5 (June):17-20.

This article overviews several common methods of answer judging in CALL, and builds to a description of PSC, or probability sequence checking. The first part of the article details how typical answer judging routines either are too lenient in what they allow as correct answers or reject answers that should be construed as correct. While PSC does not entirely overcome these drawbacks, the author claims that PSC "provides routines that avoid most of the problems observed so far and also allows teacher/programmers to exercise their judgement in the range of misspellings to be allowed." (p. 20)

The routine derives from the Markov chain, a mathematical predictor of spelling. The chain starts with the most frequent letters and predicts the letters following based on those that have come before, so that predictability of spelling accuracy increases with word length. In PSC, length is first checked, and any string varying from the correct answer by more than two answers is rejected. The first and last letters are then checked, and any string with neither first nor last letter coinciding with that in the expected answer is rejected. Strings that pass both these tests are then put through the PSC algorithm, which "adds up the frequency rank values of the letters of the student's answer and calculates a ratio between that sum and the sum of the frequency ranks for the correct answer. If that ratio is within programmed tolerances, the word is accepted as a probable misspelling." (p. 20) The program occupies 6K of memory and is written in Applesoft BASIC.

Stevens, Vance. 1984. Can CAI be evaluated? TESOL Newsletter 18 (February), 1:16,18.

Before the question in the title can be answered, one must first consider the question: "how effective are the instruments purporting to measure the effectiveness of CAI? It is possible that existing methods of conducting such studies may not be appropriate for work with CAI." (This and other quotes: p. 16) Noting that most studies of CAI have so far focused on the effectiveness of the medium, Stevens points out that "no one has ever been able to prove quantitatively, nor to a degree that would convince skeptics that their attention to the medium was warranted, that CAI is superior to traditional teaching methods." The main explanation for this is the fact that success with CAI has more to do with the cognitive and attitudinal sides of human behavior than with the behavioral side.

As with any study of cognition or attitudes, "Whether conventional research is able to measure the true benefits of CAI is itself doubtful." Research in cognition or in attitudes is difficult to quantify, because there are so many variables involved, because different media do not lend themselves to comparison any more than do apples and oranges, and because the absence of voluntarism in controlled experimentation adversely compromises CAI.

A better measure of the effectiveness of CAI is that: "Anyone who has experienced interaction with computers and who has watched others interact knows that there is something going on there that doesn't meet the eye. It meets instead the mind. The mind is very actively engaged in pursuing not only the subject matter at hand, but in trying to figure out how the program works and how it can be exploited and controlled. A part of the mind is activated which is often left dormant in other modes of instruction." The extent to which this is true depends of course on the depth of programming. As Stevens points out, "a puzzle is interesting only so long as it remains unsolved. So it may be with effective CAI."

This article ends with a call for more research, not into the effectiveness of CAI, but into isolating and studying "those variables that CAI actually involves, the cognitive and attitudinal ones ..." (See Hartig, 1984, for similar insights into problems with evaluation.)

Stevens, Vance. 1984. The effects of choice and control in computer-assisted language learning in teaching supplementary grammar to intermediate students of ESL and to remedial English students at the college entry level. TESOL Quarterly 18 (March), 1:141-3.

This is an abstract of research done on the effects of allowing students choice and control in moving through tutorial CALL lessons. Two such lessons were created, both identical except that one conveyed students through the lesson in linear fashion while the other allowed jumping about at the whim of the students. Evidence was not found to support any conclusions at alpha $< .05$; however, it was shown that the lessons allowing choice and control were more effective with non-native speakers of English at $p < .10$. It was also found, on the basis of data collected from questionnaires, that CAI resulted in favorable attitudes, and that students given choice and control over their learning had more favorable attitudes toward the computer than those who were not.

These results lend credence to the suggestion that giving students choice in CAI and control over what they do on the computer facilitates their learning, and improves their attitude toward that learning.

Stevens, Vance. 1984. Implications of research and theory concerning the influence of choice and control on the effectiveness of CALL. CALICO Journal 2,1 (September):28-33,48.

This article expands on the theoretical base of the report cited above. Suggesting a departure from the behavioral base of CALL and from traditional means of evaluating the medium, more appropriate paradigms for developing and evaluating CALL are suggested. Examples of such paradigms are (1) the clarifying educational environments of Moore and Anderson (1969), (2) the conduit metaphor of Scollon & Scollon (1982), (3) the microworld concept of Papert (1980), and (4) games and autotelic environments suggested by various authors. The experiment is described more fully than in the brief TESOL Quarterly report (above), as are its implications. However, readers should beware of several editorial errors throughout the text, including an abstract having nothing to do with the article and a reversed greater-than sign on p. 32 (but the data provided in the charts, same page, are correct).

Strei, Gerry. 1984. Ware Watch. TTT Review (November):22-24.

In this edited column, Strei provides a comprehensive (and generally favorable) critique of the Grammar Mastery Series from Regents/ALA.

Susser, Bernard. 1984. A call for JALT: Some considerations on EFL CAI in Japan. JALT Newsletter 8 (Feb. 1), 2:2-7.

Written in order to "draw attention to some important considerations concerning CALL that EFL teachers in Japan should be aware of," this article surveys recent literature the field of CALL. To give an idea of the article's scope, section headings include: The Computer as a Synthetic Teacher, The Game Format, Communicative Courseware, The Computer as an Occasion for Communication, Compatibility and Transportability, Typing Ability, Composition, Effectiveness, and The Need for Programming Skills.

While the author succeeds in shedding light on many issues crucial to development of CALL, his treatment of these is cursory. Still, this article provides an adequate, if brief, overview of current trends in uses of computers in language learning.

Wagers, William D. 1984. Voice-based learning. CALICO Journal 1,5 (June):35-38.

This article is written by the product manager at the Scott Instruments Corporation, and is thus essentially an advertisement for SIC's VBLS Authoring System, which interfaces with the Instavox RA-12A and Tandberg TAL 822 voice output devices. The former is a floppy disk drive which plays analog recordings, and the latter is a tape player with a highly accurate counter. Both devices allow computer control, and can be programmed using the authoring system briefly introduced here.

Walker, Decker F., and Robert D. Hess (Eds.). 1984. Instructional software. Belmont, CA: Wadsworth Publishing Co.

This book contains articles by Alfred Bork, Patrick Suppes, Robert Gagne, John Seely Brown (BUGGY), James Kulik (meta-analysis), Thomas Malone (motivating qualities of computer games), and others. It was favorably reviewed in Journal of Computer-Based Instruction 12,2 (Spring), p. 54.

Westesen, Dan. 1984. Hot air balloon: Pilot your Apple up, up, and away. Creative Computing 10,9 (Sep):178-9.

The program described in this article allows the user to pilot a balloon over mountains and attempt to land (at an appropriate rate of descent) in a smooth clearing. The program emulates balloon functions with slow reaction times and limited fuel (but you can give yourself more, line 160). In an attempt to parallel reality "everything in this program happens very slowly until you are in trouble; then it happens all too fast" (p. 178). Listings are provided in Applesoft Basic, accompanied by a shape table in machine code.

White, Gene. 1984. From magic lanterns to microcomputers: The evolution of the visual aid in the English classroom. English Journal 73,3 (March):59-62.

This article gives a historical perspective on the microcomputer phenomenon by viewing it as a culmination of developments in visual aid materials since 1914 (as reported in the pages of the English Journal). One interesting fact is that as early as 1971, Edmund J. Farrell predicted the proliferation of computers in education ("to retrieve data on demand"), hookups to data banks through modems, record keeping functions, computer-controlled videotape, light pencils, and audio-response systems. Although Farrell's prediction of "A conversationally interactive language, machine independent and available for execution of instructional programs on many computers" has yet to come to pass, his other predictions have largely proven to be prescient.

Wresch, William. 1984. Integrated computer systems to aid all stages of the writing process. The Computing Teacher 12,1 (August/September):50-51.

This is a description of Writer's Helper, a program which integrates writers' aids into a word processing program. The program begins by offering three choices: it will present prewriting aids, the word processing program, or analyze previously written text.

Prewriting lets students (1) find a subject, (2) explore a subject, (3) organize information about a subject, or (4) develop a single paragraph. Two of these 4 programs are further subdivided on the theory "that students need a variety of approaches to match their different cognitive styles" (p. 50). Thus, to help students find a subject, Writer's Helper can (a) brainstorm, (b) help students list topics, or (c) ask questions to elicit possible topics. If students want to explore a topic, they can choose (a) Crazy Contrasts, which ask them to compare wildly illogical objects, (b) The Tree, which helps them envision branches of related subtopics, or (c) Three Ways of Looking, which helps students see their topic in isolation, as part of a process, and as part of a network. Finally, the information organization program helps students organize their information into 5 paragraphs, and the paragraph development program helps them strengthen weak paragraphs and then integrate these into their word processed composition.

The word processing part of the package was designed with two considerations in mind: it had to display possible functions on the screen, and it had to be fully integrated with the other programs in the package.

The editing and analysis part of the package has programs that (1) check for words that have homonyms, (2) calculate readability level, (3) graph lengths of sentences throughout the essay, (4) count words in each paragraph so that students can judge which might be underdeveloped, (5) print out the first sentence in each paragraph so students can check transition and logic flow, and (5) check the essay for words commonly misused. "The purpose of these editing programs is to give writers information about their work and to reinforce the idea that looking back to check for errors is a natural part of writing." (p. 51)

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Addams, Shay. 1985. Without learning to program, you can now create your own adventure games. A+ 3,6 (Jun):42-7.

This article discusses various resources, including Eamon (in the public domain), by which non-programmers may create adventure games.

Alessi, Stephen M., and Stanley R. Trollip. 1985. Computer-based instruction: Methods and development. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Geared toward "the serious CBI designer", this book is characterized as "the most comprehensive text written to date on the design of CBI." Furthermore, it is "the right book for a college level course on the design of interactive instruction." All this is according to Greg Kearsley's review in Journal of Computer-Based Instruction 12,2 (Spring), p. 54.

Carlson, Edward H. 1985. Explosion in paradise: Can you keep the population of a desert island under control? Creative Computing 11,9 (Sep):22-4.

Two programs are listed and described here. The first assumes 11 couples to have appeared simultaneously on a desert isle. Taking into account infant death rates, accidental death rates, death due to old age, births given by women between 20 and 36 (the rate variable as to attitudes and social situation) the program outputs the increasing population (and can run for hours, apparently). The second program listed computes the number of people who have ever lived on Earth, beginning just after the demise of Neanderthal Man. The two programs are coded in Basic for an IBM PC with an 80 column green screen.

Childress, W. Michael. 1985. Correlation Analysis: A statistical test for relationships between two sets of data. Creative Computing 11,9 (Sep):96-9.

The program prompts users for any number of paired items, and then for variables (either numbers or rankings). The program outputs the appropriate correlation coefficient (positive or negative), degrees of freedom, and a "criterion", which is the established benchmark number for statistical significance, according to degrees of freedom (up to 39 degrees are stored in an array loaded into the program). The program is of obvious utility to educational researchers. It is listed in Applesoft Basic.

Dalgish, Gerard M. 1985. Current ESL software. TESOL Newsletter 19,1 (February):14.

In this article and the two that follow, Dalgish reviews currently available ESL courseware. Here, he notes that: (1) Much existing software is a throwback to behaviorism, and is therefore shunned by teachers. (2) Much ESL courseware "is restricted to drill and practice in which the screen is the rough equivalent of the textbook;" e.g. the MECC Teacher Utility. (3) "In ESL software there is very little departure from an exercise book," largely because the full potential of the computer is under-realized. Regents/ALA materials are cited, despite their "fairly high standard". BIPACS has made some attempt at graphics, but these materials are "slow and not too gripping." PLATO makes good use of sentence animation, but the lessons are a decade old. On the other hand, Irene Dutra's past tense spelling lessons and Michael Southwell's Comp-Lab exercises receive high marks. (4) Finally, documentation and HELP functions are generally poor. In summary, it is easy to find or create S-R based ESL courseware, but this falls short of fulfilling the potential of the medium.

Dalgish, Gerard M. 1985. Current ESL software: Branching and error correction. TESOL Newsletter 19,2 (April):23.

Continuing with shortcomings of ESL software from the article cited above, Dalgish notes the following: (1) Such courseware is typically "lockstep"; that is, it is not possible to "page" at will through the lesson. For example, to exit a lesson, perhaps in order to get back to the beginning, one often has to either complete the exercise or reboot the disk. PLATO ESL series, Regents/ALA, Dormac, BIPACS, and Intellectual Software's Comprehensive grammar review are all cited as having elements of this flaw in varying degrees. Compounding the problem (of completing an exercise) is that (2) all too often, answer judging is primitive and feedback is uninformative. DORMAC, Teacher's Friend, Hartley, and Intellectual Software are cited as being lacking in this regard. Still another shortcoming is (3) lack of student control. Dalgish cites two cases (in one unit of Grammar Mastery and in instances of ESL on PLATO) where paging and logoff are done automatically after a time interval rather than in response to a key press. This latter problem "will almost certainly promote a feeling of powerlessness over the computer which can easily be transferred to the ESL material itself."

Hofstetter, Fred T. 1985. Perspectives on a decade of computer-based instruction, 1974-1984. Journal of Computer-Based Instruction 12,1 (Winter):1-7.

This article provides a healthy look at directions CBI development should be taking, now that questions about the efficacy of the medium are mostly behind us. Ten years ago, people "wanted to perform controlled evaluations before trusting the computer with students. Today it is difficult to form control groups. Faculty members know that students in the experimental group will do better, and they do not want to deprive the control group of the use of the computer." (p. 2) This feeling has been supported by findings such as those in Kulik, Kulik, and Cohen's (1980) meta-analysis.

What determines the appropriateness of a computer used for CAI?

(1) "Graphics are the first concern in selecting a CBI machine. The number of pixels or dots that can be turned on and off determines the quantity and quality of what the user will see." (p. 3) What is hi-res today is lo-res tomorrow, and CBI developers should focus on tomorrow's machines in designing courseware (cf Bork, 1982).

(2) How students interact with the lesson is the next criterion: "Too much educational software is keyset oriented ... when students look down at the keys, they take their eyes off the screen. The keyset breaks their concentration with the instructional material on the screen." (p. 3) Four devices can help overcome this problem; hence Hofstetter expounds at length on the ergonomic and related advantages of the touch panel, mouse, light pen, and joystick. (See Munro et al., 1984, for findings on reduced intrusiveness of joystick.)

(3) "The quantity and the quality of available courseware is the third key ingredient in selecting an educational computer." (p. 4) Hofstetter recommends EPIE for rigorous reviews, but cautions that considerations enhancing transportability (as characterized by Melen's Figure of Merit) may rule out innovative designs incorporating the previously mentioned criteria. Indeed, Melen's Figure of Merit defines the lowest common denominator in the volatile software marketplace, where designers tend to eschew machine-specific innovations that will reduce chances of eventual transportability. Moreover, "In our free enterprise system, where companies intentionally change standards to force obsolescence, it is doubtful that computer-based instruction will ever enjoy courseware transportability." (pp. 5-6)

On the subject of the CBI marketplace, we are informed, for example, that Atari, Commodore, and Radio Shack are the 3 most popular among the 1 out of 8 American teenagers who own a personal computer (as of 1983). Another interesting note is that Microsoft, whose implementations of BASIC are used on both the IBM-PC and Macintosh computers, did not include the powerful SOUND, PLAY, and DRAW commands on the latter machine. Nevertheless, the Macintosh, with its icons, windows, pull-downs, etc., "will have a significant impact upon the design of educational materials." (p. 5) Even more powerful is Digital's IVIS, which "allows videodisc and the DEC Professional 350 microcomputer to share the same screen. The 350 can cut windows out of the videodisc image and replace them with computer graphics, which can be animated." (p. 5)

Subcurrents in this article, exemplified by the "sugar coated" mediocrity of courseware tending toward the Melen principle and the exceptional micro courseware that owes its development to prior implementation on powerful mainframes, are brought together in this message: "The CBI profession should develop courseware on high-end machines that will become the affordable micros of tomorrow." (p. 6) This article serves to stimulate the imaginations of those who would aspire to do that.

Jarchow, Elaine, and Janey Montgomery. 1985. Dare to use adventure games in the language arts classroom. English Journal 74,2 (February):104-106.

The authors claim in this article that adventure games "encourage development of both problem solving skills and organizational abilities and foster reading comprehension. We're convinced that language patterns surface during the exciting writing and speaking activities which follow naturally from the content of the games." (p. 104) Examples of concepts taught are cause and effect, sequencing, and decision-making. To play one such game, for example, "At least twenty commands (e.g., North, Up, Examine, Get, Attack) must be learned." (p. 105) In addition, the games promote communicative interaction among students. "Reactions to the games evoke discussions rich with new vocabulary. When pairs or small groups play, discussions of alternatives, negotiating decisions, and reaching consensus present challenges as well as help develop leadership skills." (p. 105)

Although many of the games and activities mentioned here are not for ESL students, adventure games in some form clearly create conditions for learning desireable in foreign and second language classes (see Baltra, 1984). Several critical composition activities are suggested as follow ups on the games. Eamon, an adventure series in the public domain, is mentioned, as is Story Tree (Scholastic, Inc.), which allows students to create their own stories with a variety of branched outcomes. Finally, the bibliography lists 9 adventure games, a couple of which might be appropriate to ESL.

Locatis, Craig, and Victor Carr. 1985. Selecting authoring systems. Journal of Computer-Based Instruction 12,2 (Spring):28-33.

This article starts out making the distinction between programming languages, authoring languages, and authoring systems, and proceeds to overview the latter. Some evidence is given that authoring systems may allow courseware developers to enhance productivity and quality. The authors started to review 6 such systems, but eventually became aware of over 60, and the fact that even the existing systems undergo seemingly constant revision makes a characterization of the field elusive; moreso for readers of this article, since the authors do not name or give specific examples of any of the systems they refer to. Also, this is one of those articles whose message seems to be: 'Before you start, plan everything and consider all the factors,' which is either impossible or ridiculously cumbersome to do in the real world. Still, the authors comprehensively cover most of the imaginable features and considerations in purchasing authoring systems, and as such, this is a useful introduction for anyone considering investing in tools for CAI development.

Perez, Elizabeth Carlson, and Mary Alice White. 1985. Student evaluation of motivational and learning attributes of microcomputer software. Journal of Computer-Based Instruction 12,2 (Spring):39-43.

This article explores the motivational and educational differences between computer and classroom activities and reports "a method of identifying the motivational qualities and educational value of microcomputer software from the students' point of view." (p. 39) Prior research and speculation into what makes computers motivating is overviewed (see for example Banet, 1979; Malone, 1980 & 1981, and Lesgold, 1982). The subject matter was mathematics, but findings transcend content area; one of the programs used was HOTDOG STAND (Sunburst Communications), a version of which this reviewer uses in ESL classes.

Although no significant educational differences were found, the study produced some interesting motivational attributes for computer learning as opposed to classroom-centered activities. For example, students in the classroom were motivated more by the subject matter, whereas those working at the computer were motivated more by characteristics inherent in the technology, in particular: animation. Motivating classroom attributes were achievement (knowing the right answer) and novelty (learning new things), whereas motivating computer attributes were control (making decisions), curiosity (seeing results), animation, using the computer, and learning while having fun. These and other findings "strengthen the view that a computer learning environment introduces and increases usage of varied motivational and educational factors which have the potential to improve learning as well as academic interest." (p. 42)

An additional aspect of this research was an indication of gender differences in motivation. Boys liked action games and simulations in which achievement, challenge, competition, and speed of response were the critical skills. Girls liked problem-solving, puzzles, and strategy games in which logic and calculation were the critical skills. Girls also responded more positively to animation.

Steinberg, Esther R., A.B. Baskin, and Terri D. Matthews. 1985. Computer-presented organizational/memory aids as instruction for solving Pico-fomi problems. Journal of Computer-Based Instruction 12,2 (Spring):44-49.

A Pico-fomi problem is one in which the computer is thinking of a four digit number, and the computer divulges how many digits in a user's guess are in that number, and how many are both in that number and correctly placed. Solution of the problem is strictly a matter of strategy, which is why this particular problem was chosen for this study of problem solving strategies. There is however a related language game, in which another player (a computer, for example), is thinking of a four letter word, and in which an element of linguistic ability is interjected.

In this study, 104 subjects were initially presented problems accompanied by one of two types of charts for use in solving the problems. The charts were either matrix (geared toward analytic personality types), or verbal (geared toward more global thinkers). In the initial session, subjects were randomly assigned chart types, and also to either the option or requirement to use the chart. The programs were designed so that students who used the charts were instructed in their use. In a second session one week later, students were given the charts they had originally had, but this time, only if they requested them. It is not clear from the report if there was instruction the second time, but I doubt if there was.

The experiment sought to determine if students would initially elect to use the charts, and if they would continue to use them once they had been given them. In addition, the researchers sought insights into how use of the charts related to problem solving strategies; specifically, how control over use of the charts (learner or computer), and how chart format (matrix or verbal) would affect these strategies. Finally, the study sought information on how the above two factors would affect acquisition of the rules of inference.

In the experiment, all students used the charts on the initial task whether required to or not, and at the repeat session, 75% of all subjects requested the charts. In addition, use of the charts significantly facilitated performance, and matrix charts were found to be more useful (but not significantly so). Individual differences in use of the charts were also recorded; for example, it was found that some learners relied less and less on the charts, but that some students preferred to let the computer do their thinking for them so that, in effect, the existence of the facilitative charts prevented them from learning the rules of inference involved. Incidentally, 17 such rules were isolated and divided into 3 general categories, and data were accumulated on how these rules appeared to have been learned and followed by students solving the problems.

In conclusion, the authors suggest that use of facilitative charts should be required for students failing in a task, but not forced on students who are otherwise succeeding. In addition, charts should be phased out as students become more proficient, and also if it becomes evident that students are not improving even with access to charts. "If the student knows that the computer will always provide feedback that tells what to do, he will have no motivation to learn why." In addition, findings show that, whereas such feedback helped some students to cope when feedback was later removed, for others, "There may be no transfer to problems where no feedback is provided." (p. 49)

Stevens, Vance. 1985. You'd be surprised at how much public domain software you can adapt to ESL and language learning. TESL Reporter 18,1 (January):8-15.

Directed at novice computer users, this article describes how public domain software can be obtained and adapted to ESL and foreign language learning situations. Toward the latter end, the article explains how variables, arrays, and print and data statements function in BASIC programs, and how these can be manipulated to modify the output of the program. Finally, several examples of easily modifiable public domain programs are given, along with suggestions for their adaptation to ESL.

Williams, Steven E. 1985. Ice Cream Van. Creative Computing 11,9 (Sep):94-5.

Players can attempt to recoup their $2000 investment on a '79 Ford van, starting from a tank of gas and $100-$150 in cash. Each player selects and buys varieties of ice cream, establishes a route, advertises, banks money, and maintains the decrepit old van. According to the author, it is difficult to win. The program is listed here, coded in Model 100 Basic (for TRS-80 Model 100/200, NEC 8201A, or Olivetti M10), but is "easily adaptable" (if you are a skilled programmer) to other computers with Microsoft Basic. The program needs only 8K of RAM.

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White, Gene. 1984. From magic lanterns to microcomputers: The evolution of the visual aid in the English classroom. English Journal 73,3 (March):59-62.

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Wise, Richard E. 1983-84. Analyzing the cost effectiveness of alternative instructional media. International Journal of Instructional Media 11,3:189-194.

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Wresch, William. 1984. Integrated computer systems to aid all stages of the writing process. The Computing Teacher 12,1 (August/September):50-51.

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Wyatt, David H. 1984. Computer-assisted language instruction: present state and future prospects. In Wyatt, David H. (Ed.). Computer-assisted language instruction. Oxford, UK/New York: Pergamon Press. pp. 3-11. Reprinted from System 11,1 (1981); also appears in Sauve and Schnuer, NCBE, 1984:3-11.

Wyatt, David H. 1984. Computer-assisted teaching and testing of reading and listening. Foreign Language Annals 17,4:393-408.

Wyatt, David H. 1984. Computers and ESL. ERIC: Center for Applied Linguistics.

Zsiray, Stephen W., Jr. 1983-84. A comparison of three instructional approaches in teaching the use of the Abridged Readers' Guide to Periodical Literature. Journal of Educational Technology Systems 12,3:241++

* =*= * 1985 * =*= *

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Alessi, Stephen M., and Stanley R. Trollip. 1985. Computer-based instruction: Methods and development. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Addams, Shay. 1985. Without learning to program, you can now create your own adventure games. A+ 3,6 (Jun):42-7.

Bangert-Drowns, Robert L., James A. Kulik, and Chen-Lin C. Kulik. 1985. Effectiveness of computer-based education in secondary schools. Journal of Computer-Based Instruction 12,3 (Summer):59-68.

Barry, John A. 1985. Righting your writing: Two programs that improve your grammar. A+ 3,5 (May):49-53.

Been, Bill. 1985. Computer placement in the school. C.U.E. (Computer Using Educators) 8,1 (Sep):12-14.

Bork, Alfred. 1985. Personal computers for education. New York: Harper & Row; reviewed by Greg Kearsley (1985) in Journal of Computer-Based Instruction 12,3:87.

Bostad, Dale A. 1985. Soviet patent bulletin processing: A particular application of machine translation. CALICO Journal 2,4 (June):27-30.

Burger, Karen. 1985. Computer assisted instruction: Learning style and academic achievement. Journal of Computer-Based Instruction 12,1 (Winter):21-22.

Carlson, Edward H. 1985. Explosion in paradise: Can you keep the population of a desert island under control? Creative computing 11,9 (Sep):22-4; describes and lists a human population simulation program; with some work, could be made into a realistic game, in which variables could be manipulated by students and results discussed.

Chen, Milton, and William Paisley. 1985. Children and microcomputers: Research on the medium. Beverly Hills, CA: Sage Publications.

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11,9 (Sep):96-9.

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Dalgish, Gerard M. 1985. Current ESL software. TESOL Newsletter 19,1 (February):14.

Dalgish, Gerard M. 1985. Current ESL software: Branching and error correction. TESOL Newsletter 19,2 (April):23.

Dalgish, Gerard M. 1985. Current ESL software: Student control/teacher control. TESOL Newsletter 19,3 (June):9.

Dutra, Irene. 1985. Hypothesis testing and problem-solving software for ESL students. Paper presented at at the 19th Annual TESOL Convention, New York, April 8-14.

Eastmond, J. Nicholls, Jr., and Richard Mosenthal. 1985. The World Center for Computing's pilot videodisc project for French language instruction. CALICO Journal 2,4 (June):8-12,48.

Eckhard, Robert C. 1985. Penny-wise programs: Public domain software for the Macintosh. A+ 3,7 (July):101-106,113-116.

Fisher, Glenn. 1985. Future directions in computing. C.U.E. (Computer Using Educators) 8,1 (Sep):5.

Foster, Edward. Artificial intelligence: Beyond the buzzwords. Personal Computing 9,4 (April):62-9; includes: Voice recognition on intelligent machines, p. 66.

Geisler, Cheryl. 1985. WARRANT: A pedagogical environment for critical reading, reasoning, and writing. CALICO Journal 2,4 (June): 43-44.

Green, John O. 1985. A conversation with Seymour Paper: LOGO under fire. Classroom Computer Learning, January:28-9,58-9.

Gustafson, Thomas J. 1985. Microcomputers and educational administration. Englewood Cliffs, NJ: Prentice-Hall.

Hall, Keith A., and Sallie J. Sherman. 1985. Computer applications in education and training: A curriculum development model and the curriculum. Journal of Computer-Based Instruction 12,1 (Winter):23-25.

Hancock, Charles R. 1985. Baltimore city schools use microcomputers to teach writing. CALICO Journal 2,3 (March):13-16.

Harris, Clifton S. 1985. The information age: Decision makers have a new resource in prospect. T.H.E. Journal (Technical Horizons in Education) 12,9 (May):69-71.

Hofstetter, Fred T. 1985. Perspectives on a decade of computer-based instruction, 1974-1984. Journal of Computer-Based Instruction 12,1 (Winter):1-7.

Jarchow, Elaine, and Janey Montgomery. 1985. Dare to use adventure games in the language arts classroom. English Journal 74,2 (February):104-106.

Karwin, T.J., E.M. Landesman, and R.W. Henderson. 1985. Applying cognitive science and interactive videodisc technology to precalculus mathematics learning modules. T.H.E. Journal (Technical Horizons in Education) 13,1 (August):57-63.

Kramsch, Claire, Douglas Morgenstern, and Janet H. Murray. 1985. An overview of the MIT Athena Language Learning Project. CALICO Journal 2,4 (June):31-34.

Langley, Bob. 1985. Computer use at Country High School, Vacaville, CA. C.U.E. (Computer Using Educators) 8,1 (Sep):9.

Larson, Jerry W., and Harold S. Madsen. 1985. Computerized adaptive language testing: Moving beyond computer-assisted testing. CALICO Journal 2,3 (March):32-36,43.

Levinson, Cynthia Y. 1985. Education by telecommunications at the elementary and secondary level: Practices and problems. T.H.E. Journal (Technical Horizons in Education) 12,8 (April):71-3.

Locatis, Craig, and Victor Carr. 1985. Selecting authoring systems. Journal of Computer-Based Instruction 12,2 (Spring):28-33.

Mace, Scott. 1985. Logic games: Tools for thought. Personal Computing 9,3 (Mar):145; interesting programs for an ESL class.

Mace, Scott. 1985. Do-it-yourself Adventures. Personal Computing 9,6 (June):39.

Mace, Scott. 1985. Games for word wizards. Personal Computing 9,7 (July):43.

McGrath, Lindsay. 1985. Software on a shoestring. A+ 3,1 (Jan):71-8

Murphy, Jamie. 1985. Stepping into the story: Players participate in "interactive fiction". Time, May 13:64.

Naiman, Adeline. 1985. In search of learning software. Personal Computing 9,6 (June):35.

Nesbit, John C. 1985. Approximate string matching in response analysis. Journal of Computer-Based Instruction 12,3 (Summer):71-5.

Niman, John. 1985. A teachers companion to microcomputers. Lexington, MA: D.C. Heath & Co.; reviewed by Greg Kearsley (1985) in Journal of Computer-Based Instruction 12,3:87.

Norris, William C. 1985. Improving education through technological innovation. T.H.E. Journal 12,10 (June):65-8.

Ohles, John F. 1985. The microcomputer: Don't love it to death. T.H.E. Journal (Technical Horizons in Education) 13,1 (August):49-53.

O'Malley, Christopher. 1985. Boosting your child's creativity: When children play with computers, are they expressing themselves or just having fun? New computer programs designed with youthful creativity in mind, make it easier for your kids to do both. Personal Computing 9,3 (Mar):100-107; try some of these commercial programs on ESL students.

Parkhurst, Christine. 1985. Using C.A.L.L. to teach composition. In Larson, Penny, Elliot Judd, and Dorothy S. Messerschmitt (Eds.), On TESOL '84. Washington, DC: TESOL. pp 255-260.

Perez, Elizabeth Carlson, and Mary Alice White. 1985. Student evaluation of motivational and learning attributes of microcomputer software. Journal of Computer-Based Instruction 12,2 (Spring):39-43.

Pfaehler, Brenda. 1985. Electronic text: The University of Wisconsin experience. T.H.E. Journal (Technical Horizons in Education) 13,1 (August):67-70.

Pugh, Stefan M. 1985. Russian CAI at Duke University. CALICO Journal 2,4 (June):6-7.

Ritacco, Michael. 1985. Developing a telecommunications system. T.H.E. Journal (Technical Horizons in Education) 12,9 (May):67-8.

Rogers, Stephen. 1985. The talking Apple. T.H.E. Journal (Technical Horizons in Education) 12,7 (March):102-3.

Rowe, A. Allen. 1985. Interactive language simulation systems: Technology for a national language base. CALICO Journal 2,3 (March):44-47.

Sandler, Corey. 1985. Telecommunications talk: The Reader's Guide goes electronic. Creative Computing 11,4 (April):28-30.

Sawyer, Teresa A. 1985. Human factors considerations in computer-assisted instruction. Journal of Computer-Based Instruction 12,1 (Winter):17-20.

Schmidt, Jenny. 1985. Adventure construction set. Nibble 6,5 (May):56-75; lists program.

Severino, Michael. 1985. How a small district is moving into the 21st century. T.H.E. Journal 12,10 (June):61-4.

Simonsen, Sofus E. 1985. Student approach and reaction to CAI: An analysis of evaluations and logs. CALICO Journal 2,4 (June):35-39.

Spiller, Rex. 1985. The contribution of training technologies to productivity. T.H.E. Journal (Technical Horizons in Education) 13,1 (August):64-66.

Staples, Betsy. 1985. Educational computing: Where are we now? Creative Computing 11,4 (April):62; also SAT packages: An update, pp. 86-89.

Steinberg, Esther R., A.B. Baskin, and Terri D. Matthews. 1985. Computer-presented organizational/memory aids as instruction for solving Pico-fomi problems. Journal of Computer-Based Instruction 12,2 (Spring):44-49.

Stevens, Vance. 1985. You'd be surprised at how much public domain software you can adapt to ESL and language learning. TESL Reporter 18,1 (January):8-15.

Stevens, Vance. 1985. Review of Higgins, John, and Tim Johns, Computers in Language Learning (1984). CALICO Journal 2,3 (March):27.

Stevens, Vance, Roland Sussex, and Walter Tuman. 1985. A bibliography of computer-aided language learning. ERIC Clearinghouse on Languages & Linguistics, ED 254 072.

Takalo, Ronald. 1985. Language test generator. CALICO Journal 2,4 (June):45-46.

Teichert, Herman U. 1985. Computer-assisted instruction in beginning college German: An experiment. CALICO Journal 2,3 (March):18-24,43.

Tripp, Steven D. 1985. A Japanese word processor for the Apple. CALICO Journal 2,4 (June):21-23.

van Dijk, Tim A.M., F. Gastkemper, J. Moonen, and W. Romeijn. 1985. Motives for CAI in post-secondary education. Journal of Computer-Based Instruction 12,1 (Winter):8-11.

Weal, Elizabeth. 1985. Software for budding young writers: Storymakers can help youngsters blossom. A+ 3,4 (April):34-38.

Wesley, Beth Eddinger, Gerald H. Krockover, and Charles R. Hicks. 1985. Locus of control and acquisition of computer literacy. Journal of Computer-Based Instruction 12,1 (Winter):12-16.

Williams, Dennis A. 1985. How one school does it right. Personal Computing 9,9 (Sep):80-88; includes Status report on computers in schools, p. 88.

Williams, Steven E. 1985. Ice cream van. Creative computing 11,9 (Sep):94-5; describes variation on "lemonade stand" simulation program, includes program listing.

Wilson, Lois S. 1985. TICCIT: A computer-based success story. T.H.E. Journal (Technical Horizons in Education) 12,7 (March):94-5.

Wyatt, David H. 1985. Intelligent CALL. CALL News and Reviews 1,2:1-2.

Also: there is an article on an artificially intelligent LISP-based tutorial (expert system) in Byte, April 1985.

---**- RESOURCE GUIDE -**---

I. Organizations and Clearing Houses

ADCIS (Association for the Development of Computer-Based Instruction Systems), Computer Center, Western Washington University, Bellingham, Washington 98225; conferences, interest group activities, publications

Apple Education Foundation; Apple Computer, Inc., 10201 N. DeAnza Blvd, Cupertino, CA 95014

Association for Computer-Assisted Learning, Educational Computing Section, Chelsea College, University of London, Friese Green House, Chelsea Manor St., London Sw3 6LX

Association for Literary and Linguistic Computing (ALLC), Literary and Linguistic Computing Centre, Sidgwick Site, Cambridge CB3 9DA

Bibliographic Retrieval Services, 1200 Route 7, Latham, New York 12110; has database of instructional software available for use with microcomputers

Bilingual Educators for Computer Assistance (BECA), Campus Box 136, Texas A&I University, Kingsville, TX 78363.

British Council, 20 Carlton House Terrace, London SW1Y 5AP, Centre for Information on Language Teaching and Research (CILT); has annotated Specialised Bibliography B32 (1982) on CALL, among other resources

CALICO (Computer Assisted Language Instruction Consortium), 3078 JKHB, Brigham Young University, Provo, Utah 84602

CALL-IS (Computer-Assisted Language Learning-Interest Section of TESOL), % Head, Learning Laboratories, Concordia University, 1455 deMaisonneuve West, Montreal, Quebec, Canada H3G-1M8

CHIME (Clearinghouse of Information on Microcomputers in Education), 108 Gunderson, Oklahoma State University, Stillwater, OK 74078

CONDUIT, University of Iowa/Oakdale, P.O. Box 388, Iowa City, Iowa

52244. (Publication called Pipeline, Software clearing house)

Council for Educational Technology in the United Kingdom (CET), 3 Devonshire St., London W1N 2BA

EDUNET (EDUCOM), P.O. Box 364, Princeton, NJ 08540. (Promotes sharing of computer-based resources.)

The English Microlab Registry, 1211 47th St., Lubbock TX 79412; a database of facilities in language-related departments in colleges and universities using microcomputers for teaching and research in composition

ERIC Clearinghouse on Languages and Linguistics, Center for Applied Linguistics, 1118 22nd St., N.W., Washington, D.C. 20037: Search "Computer-Assisted Instruction in Second Languages" (915); Microcomputers in elementary and secondary education: A guide to the resources (1983) contains information similar to that in this bibliography; also has minibibliographies, books on CALL, etc.

EZUG (Educational ZX-80/81 Users Group) % Eric Deeson, Highgate School, Birmingham, B12 9DS

International Council for Computers in Education (ICCE), U. of Oregon, 1787 Agate St., Eugene, OR 97403; class and workshop resources, etc.

Micro Users in Schools and Education (MUSE), Freepost, Bromsgrove, Worcestershire, BG1 7BR

Minnesota Educational Computing Consortium, 2520 Broadway Dr., St. Paul (Lauderdale), MN 55113. (Acts as a clearing house for educational software, has CAI-related publications.)

NCTE, 1111 Kenyon Rd, Urbana, Ill. 61801; several of its books and two of its periodicals (College Composition and Communication; and English Journal) occasionally contain articles on CAI

NECC (National Educational Computing Conference) exists to create interaction among educational computer users; has an annual conference, publishes proceedings

Newswire, Dennis Sayers, New England BEMSC Satellite Office, University of Hartford, Hillyer Hall, 200 Bloomfield Ave., West Hartford, CT 06117; an electronic pen pal program for LEP students operating via Interlearn, Inc., San Diego

Northwest Regional Educational Laboratory (NWREL), 300 S.W. Sixth Ave., Portland, Oregon 97204 runs (1) RICE (Resources in Computer Education), an on-line data base "for information on some 2000 microcomputer courseware items"; and (2) MicroSIFT (Microcomputer Software and Information for Teachers)

OUCHE (Organization for Using Computers in Hawaii Education), 95-112 Kipapa Dr. #420, Mililani, HI 96789

SMALL (Society for Microcomputer Applications in Language and Literature); merged with CALICO in late 1981; published MICRO, a low budget, but interesting, newsletter.

Also: Consult Hildebrandt, Darlene Meyers (Ed.), 1985 edition, Computing information directory, Federal Way, WA: Pedaro, Inc., for a listing similar to this one, but more generalized

II. Journals and Periodicals

ALLC Bulletin and ALLC Journal, Association for Literary and Linguistic Computing, Literary and Linguistic Computing Centre, Sidgwick Site, Cambridge CB3 9DA

L'APOP (Le Bulletin de l'Association pour les Applications Pedagogiques de l'Ordinateur au Post-secondaire), % Louise Lessard, College Bois-de-Boulogne, 10 555 av. Bois-de-Boulogne, Montreal, Canada H4N 1L3

Apple Education News, Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; free to educators

Babel (Journal of the Australian Federation of Modern Language Teachers Association)

British Journal of Educational Technology, Council for Educational Technology, 3 Devonshire St., London W1N 2BA

Byte, P.O. Box 590, Martinsville, NJ 08836. (Advanced applications, occasional articles on CAI)

CALICO Journal, 3078 JKHB, Brigham Young University, Provo, Utah 84602

CALLBOARD: contact Roger Savage, CALLBOARD Treasurer, 19 High St., Eccleshall, Stafford, U.K. ST21 6BW

C.A.L.L. Digest (Computers and Language Learning), K.I.N.Y., Hinoki International School, 2024 Center Ave. #26, Fort Lee, NJ 07024; short reports on applications, trends, developments, and software

CALL-IS Newsletter; see CALL-IS in Section I

CALNEWS, Council for Educational Technology, 3 Devonshire St., London W1N 2BA

CALL News and Reviews, P.O. Box 18708, Los Angeles, CA 90007

CALL-UP: contact Peter Avis, Regional Centre Director, South Yorkshire & Humberside Microelectronics Education Programme, Exeter Road, Off Coventry Grove, Doncaster DN2 4PY

CELAO, APLV, 19 rue de la Glaciere, 75013, Paris, France. (A French CALLBOARD)

CET News, Council for Educational Technology, 3 Devonshire St., London W1N 2BA

Classroom Computer Learning, 19 Davis Drive, Belmont, CA 94002 -or- 2451 E. River Rd., Dayton, OH 45439.

Classroom Computer News, Box 266, Cambridge, MA 02138

Collegiate Microcomputer, Rose-Hulman Inst. of Technology, Terre Haute, IN 47803

Computer Education: A Journal for Teachers, Computer Education Group, North Staffordshire Polytechnic, % H.L.W. Jackson, Black Heath Lane, Stafford, England

Computer Student, The Apple Computer Clubs, 217 Jackson St., Box 948, Lowell, MA 01853; prints blurbs, articles, interviews, tutorials (e.g. assembly, graphics), and program subroutines and listings.

Computers & Education, Pergamon Press, Fairview Park, Elmsford, NY 10523. Covers computer use in "all aspects of education", not just CAI

Computers & Composition % Cynthia Selfe, Michigan Tech Univ., Houghton, MI 49931

Computers & the Humanities (Amsterdam)

Computers in Human Behavior, Pergamon Press, Maxwell House, Fairview Park, Elmsford, NY 10523

Computers in Schools, see MUSE in Section I

Computers, Reading, and Language Arts (CRLA), P.O. Box 13247, Dept. N, Oakland, CA 94661

The Computing Teacher, Computing Center, Eastern Oregon State College, La Grande, OR 97850 -or- Dept of Computer and Information Science, University of Oregon, Eugene, OR 97403-1923

Creative Computing, P.O. Box 789-M, Morristown, N.J. (Frequently has articles on CAI and/or reviews of educational software)

CUE Newsletter (Computer-Using Educators), Box 18547, San Jose, CA 95185 -or- 127 O'Connor St., Menlo Park, CA 94025.

EDUBUS, 2500 University Dr., Calgary, Canada T2N 1N4

Education Computer News, Capitol Publications, 1300 N. 17th St., Arlington, VA 22209; biweekly

Educational and Instructional Television (EITV), 51 Sugar Hollow Rd., Danbury CT 06810. The May 1979 issue (Vol. 11 #5) is largely about interactive video

Educational Computer (no longer publishing, according to Time, June 4, 1984)

Educational Computing, 30-31 Islington Green, London, N1

Educational Media International, 3 Greenway, London N20 8EE; Issue No. 1, 1982, has numerous one-page articles on computers in education

Educational Technology, 140 Sylvan Ave., Englewood Heights, NJ 07632. (See the January 1983 issue for half a dozen timely articles on educational computing, and for a special section on standards for and evaluation of courseware.)

Electronic Education, 1311 Executive Center Drive, Suite 220, Tallahassee, FL 32301

Electronic Learning, Box 645, Lyndhurst, NJ 07071 -or- 902 Sylvan Ave., Englewood Cliffs, NJ 07632 -or- 730 Broadway, New York, NY 10003-9538; Frequently synthesises resource information directory-style

EZUG Newsletter; see EZUG in Section I

Hands On!, 8 Eliot St., Cambridge, MA 02138

ILEA Educational Computing Newsletter, Inner London Education Authority, County Hall, London

InCider, CW Communications, 80 Pine St., Peterborough, NH 03458.

Interface Age, P.O. Box 1234, Cerritos, CA 90701. (Occasional articles on education.)

International Journal of Instructional Media, 120 Marine St., Farmingdale, NY 11735. (Scholarly articles)

Instructional Innovator

Journal of Computer-Assisted Learning, Blackwell Scientific Publications Ltd. (Oxford); % Editor: Robert Lewis, Director, Inst. of Education Computing, St Martin's College, Lancaster, U.K.

Journal of Computer-Based Instruction, Association for the Development of Computer-Based Instructional Systems (ADCIS), 3255 Hennepin Ave. So., Minneapolis, MN 55408

Journal of Educational Technology Systems, 120 Marine St., Farmingdale, NY 11735. (Scholarly articles)

LOGO & Educational Computing Journal, 1320 Stony Brook Rd., Stony Brook, NY 11790

Machine-Mediated Learning, Crane, Russak & Co., Inc., 3 East 44th St., New York, NY 10017. (Scholarly articles)

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Media and Methods, 1511 Walnut St., Philadelphia, PA 19102

MICRO, former publication of SMALL (see Section I)

Microcomputer Digest, C.E.O. Associates, 201 Route 516, Old Bridge, NJ 08857

Microcomputers in Education, 5 Chapel Hill Drive, Fairfield, CT 06432

Micronica, Bilingual Educators for Computer Assistance (BECA), Campus Box 136, Texas A&I University, Kingsville, TX 78363.

Microsift News / Microsift Review. Northwest Regional Educational Laboratory, 500 Lindsay Bldg., 710 S.W. Second Ave, Portland, Oregon 97204. (Journal of "a clearinghouse for microcomputer K-12 instructional software and information")

NALLD Journal (National Association of Learning Laboratory Directors, Academic Publications, University of Louisville, 2301 So. 3rd St., Louisville, KY 40292

On Computing (non-technical)

Personal Computing, Box 2940, Boulder, CO 80322. (Occasional articles on computers in education)

Pipeline, P.O. Box 388, Iowa City, Iowa 52244. (Publication of CONDUIT; see software resources)

Popular Computing; has a Guide to Computers in Education, free to subscribers

Research in Word Processing Newsletter % Dr. Bradford Morgan, So. Dakota School of Mines and Technology, Rapid City, SD 57701; clearinghouse of information on applications of computers to teach writing at all levels

Scholastic MICROZINE, P.O. Box 645, Lyndhurst, NJ 07071-9986; a periodical on disk

Softalk, 10432 Burbank Blvd., North Hollywood, CA 91601. (Separate publications for Apple and for IBM; the one for Apple recently carried regular columns called The Schoolhouse Apple by Jean Varven and LOGO Ideas by Jim Muller, plus occasional feature articles on computers in education; unfortunately, publication suspended)

System, Pergamon Press, Maxwell House, Fairview Park, Elmsford, NY 10523

Teaching and Computers, 902 Sylvan Ave., Englewood Cliffs, NJ 07632

The TEC News % Mark Wasicsko, School of Education, Texas Weslayan College, Fort Worth, Texas, 76105

TESOL Newsletter, 202 D.C. Transit Bldg., Georgetown Univ., Washington

D.C. 20057; "On Line" column about CALL

T.H.E. Journal (Technical Horizons in Education), P.O. Box 992, Acton, MA 01720 (Available free to qualified individuals)

USER'S: The MECC Instructional Computer Newsletter. 2520 North Broadway Dr., St. Paul, MN 55113 -or- 3490 Lexington North, St. Paul, MN 55112

III. Public Domain Software

Addison Wesley books of 1985 software; see section VI below.

AdventureDisk, P.O. Box 216 Mercer Island, WA 98040; $6/disk; reviews, hints, solutions, and source for Eamon games and Eamon Dungeon Designer (reviewed by Shay Addams (1985) in A+ 3,6)

American Software Publishing, Box 57221, Washington, D.C. 20037; mentioned in A+ 3,1:78 (1985)

Apple Avocation Alliance (AAA), 2111 Central Ave., Cheyenne, WV 82001; mentioned in A+ 3,1:78 (1985)

Apple PugetSound Program Library Exchange (A.P.P.L.E.), 21246 68th Ave S. Kent, WA 98032; Publishes Call-A.P.P.L.E., disseminates software; mentioned in A+ 3,1:78 (1985)

Appleware, Inc., 6400 Hayes St., Hollywood, FLA 33024; has public-domain type games, utilities, etc. for $1 a program

Big Red Apple Club, 1105 So. 13th, Suite #103, Norfolk, NE 68701; mentioned in A+ 3,1:78 (1985)

Chicago Public Library, North Pulaski Branch, 4041 West North Ave., Chicago, IL 60639; mentioned in A+ 3,1:78 (1985)

Clearinghouse for Free Computer Materials, Ryan Library, Iona College, New Rochelle, NY 10801

Commodore Users Group, Box 2310, Rosenberg, OR 97470; membership fee for subscription to Command Performance and access to public domain library

Computer Learning Center, P.O. Box 110876-A, Tacoma, WA 98411; EAMON Introductory Offer; 6 text adventures for $20, according to A+ 3,7:79 (July, 1985)

Computer Using Educators (CUE), San Mateo County Office of Education, SMERC Library, 333 Main St., Redwood City CA 94063; newsletter, Softswap collection of public domain programs

CP/M Users' Group, 1651 3rd Ave., New York, NY 10028; mentioned in A+ 3,1:78 (1985)

CP/M Users' Group % Jim Ayers, Computer Systems of Marin, 301 Poplar St., Mill Valley, CA 94941; mentioned in A+ 3,1:78 (1985)

International Apple Core (IAC), 908 George St., Santa Clara, CA 95050; mentioned in A+ 3,1:78 (1985)

Micro Users in Schools and Education (MUSE), Freepost, Bromsgrove, Worcestershire, BG1 7BR "supports a software library at Oundle School, Northamptonshire" according to British Council CIS/CILT Specialised bibliography B32 on CALL, Oct. 1982

North Central Regional Library, Software Mail Order Dept., 238 Olds Station Rd., Wenatchee, WA 98801; mentioned in A+ 3,1:78 (1985)

Pandora Software, Clearfield, Utah; 4000 programs in 200 volumes (20/vol.), 43 categories, of which education, games, quizzes are 3; $5/vol; In THE Journal 12,10:44 (June, 1985)

Public Domain, Inc., 5025 So. Rangeline Rd., West Milton, OH 45383

Public domain software directory for the IBM PC. Santa Clara, CA: PC Software Interest Group; in THE 12,1:64 (August, 1984)

Young Peoples' Logo Association, P.O. Box 855067, Richardson, TX 75085; send self-addressed stamped envelope for catalog of public domain programs available for exchange

IV. Vendors

These vendors are listed alphabetically and according to information available to me, often in the form of the vendors' own brochures or advertisements. The items listed may or may not be appropriate to ESL/FL; listing is not endorsement.

Note: Apple, Groleer, Hartley, Sunburst, and Scholastic provide software "lab pack" quantities; that is, half a dozen disks for the price of two or three (per C.U.E. 8,1:3&7; Sept. 1985)

Advanced Learning Systems, P.O. Box 5127, Eugene, OR 97405; IMA Typer typing tutorial (ESL version available).

Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. Has PILOT and SuperPILOT, both authoring languages for Apple II. Also, editable educational packets, such as Magic Spells

Aquarius People Materials, Inc., P.O. Box 128, Indian Rocks Beach, FL 33535

Artificial Intelligence Resource Group, (213) 656-7368 (Eliza)

Avant-Garde Creations, 37B Commercial Blvd., Novato, CA 94947; Z.E.S. authoring system, fancy programming utilities, PAL reading system;

free sample disks

Ballard & Tighe, 480 Atlas St., Brea, CA 92621; Idea Cat, Elephant Ears, and Mouse Math (all ESL and Spanish CALL) with Echo+ voice synthesizer interface

Bantam, Creative Contraptions (create a machine to accomplish a specific purpose), and Escape and The Cave of Time (interactive fiction for ages 10 and up; ESL maybe??) commented on by David H. Ahl (1985) in Creative Computing 11,9:8

BCD Associates, Inc., 5809 S.W. 5th St., Suite 101, Oklahoma City, OK 73128; VTR interface and controller devices, "The Instructor" interactive video authoring system and other video control software

Bell & Howell, 7100 N. McCormick Road, Chicago, IL 60645. Has PASS, AVA, & V/CDS authoring systems with interactive video capabilities

BIPACS, 33 W. Walnut St., Long Beach, NY 11561. Has an ESL software series for Apple II, Express Trainer authoring system; does customized programming

Bobbs-Merrill Educational Publishing, 4300 West 62nd St., P.O. Box 7080, Indianopolis, Ind. 46206; books and software, particularly programming and utilities

Brainworks, Calabazas, Calif.; Chipwits (for Macintosh) reviewed by Scott Mace in Personal Computing 9,3:145

Britannica Computer Based Learning, Encyclopedia Britannica Educational Corporation, 425 North Michigan Ave. Dept. 10A, Chicago IL 60611. Program packages for language arts/reading (claimed to be applicable to ESL)

Broderbund Software, 17 Paul Dr., San Rafael, CA 94903; The Print Shop reviewed by Robert Cowart (1984) in A+ 2,12:95-6; Where in the World is Carmen San Diego (geography and almanac skills; ESL, maybe??) mentioned in C.U.E. 8,1:7 (1985) and reviewed by Scott Mace (1985) in Personal Computing 9,9:23 and by David Ahl (1985) in Creative Computing 11,8:68; Forthcoming: Fantavision (special effects/animation generator), Science Toolkit

CBS Software, One Fawcett Place, Greenwich, CT 06386; Adventure Master reviewed by Shay Addams (1985) in A+ 3,6 and by Scott Mace (1985) in Personal Computing 9,6:39; Wordfinder and Pathwords reviewed by Scott Mace (1985) in Personal Computing 9,7:43

CodeWriter Corporation, 7847 North Caldwell, Niles, IL 60648; AdventureWriter reviewed by Shay Addams (1985) in A+ 3,6 and by Scott Mace (1985) in Personal Computing 9,6:39

Collins ELT, Marketing Dept., 8 Grafton St., London W1X 3LA; Higgins & Johns's TEXTBUILDER (TEXTBAG & CLOSEUP), and Tim Johns's WORDBUILDER

COMPress, P.O. Box 102, Wentworth, N.H. 03282. Has "EnBASIC", an enhancement to Applesoft BASIC which allows certain subroutines (e.g. answer judging) to be implemented with simplified commands. Also, foreign language software

Computer Advanced Ideas, (415) 526-9100. Games applicable to ESL, with authoring capabilities

Computer Curriculum Corp., 1070 Arasradero Rd., P.O. Box 10080, Palo Alto, CA 94304-0812; interactive audio, MICROHOST Instructional System

Concordia University, Language Lab, 1455 deMaisonneuve W., Montreal, Quebec, Canada H3G-1M8; Reading for Information, Non-Verbal Communication reviewed by Patrick Kelly (1985) in CALICO Journal 2,4:44,48; L'Accord du Participe Passe reviewed by Roland A. Champagne (1985) in CALICO Journal 2,3:43

CONDUIT, P.O. Box 388, Iowa City, Iowa 52244, has 58 "English: Basic Mechanics" lessons, 7 45-minute modules of syntax tutorials called "Dialog", and an authoring program called "Dasher"; Practicando Espanol reviewed by Ronald Takalo, and Lecciones Espanol reviewed by Thomas A. Claer, in CALICO Journal 2,3:40

Convox, Inc., 675-D Conger St., Eugene, OR 97402; has Voice Master card (with microphone) for digitalized speech storage and playback.

CTB/McGraw-Hill, Del Monte Research Park, 2500 Garden Rd., Monterey CA 93940; MIMS instructional management system

Dalroth Computer Products, Ltd, Interactive Video Systems Division, 4 Half Moon St., Mayfair, London W1Y 7RA, U.K.; has IVL interfacing video with Apple II/IIe

DataTech Software, 19312 East Eldorado Drive, Aurora, CA 80013; "Mentor", an authoring system

Davidson and Associates, 6069 Groveoak Place, Suite 12, Rancho Palos Verdes, CA 90274; Word Attack! reviewed by Jock Root (1983) in Softalk 3,11:107-9, and in CALL News and Reviews 1,2:3-4 (1985).

DCH Educational Software, D.C. Heath & Co., 125 Spring St., Lexington, MA 02173; has QUILL, a package with Planner (generate and organize thoughts), Library, Mailbag, and Writer's Assistant programs; Verb Viper deemed "effective" for ESL in review by Ruth Cole (1985) in C.U.E. 8,1:26

DesignWare, 185 Berry St., San Francisco, CA 94107; Spellagraph reviewed in Electronic Learning 4,2 (October, 1984):ESR-7.

DLM Teaching Resources, One DLM Park, Allen, TX 75002; has Freddy's Puzzling Adventures which lets students play or create number and word puzzles; Arcademic Drill Builders reviewed in Electronic Learning 4,2 (October, 1984):ESR-5

Dolphin Software, 230 So. 39th St., Boulder, CO 80303; Spanish Verb Quiz reviewed by Richard A. Raschio (1985) in CALICO Journal 2,3:42-3

Dormac Inc., P.O. Box 1699, Beaverton, Oregon 97075; 14 diskettes of ESL lessons on syntax with an accompanying workbook

Dynacomp, Inc., 1427 Monroe Ave, Rochester, NY 14618 -or- 1064 Gravel Rd., Webster, NY 14580; Genesis adventure writer

Educational Activities, Inc., P.O. Box 392, Freeport, NY 11520; reading, language arts, etc., including ESL and bilingual software; Dragon Game Series reviewed by Robert G. Hackenberg (1984) in CALICO Journal 2,2:38-9

EduSoft Educational Software, P.O. Box 2560-A5, Berkeley, CA 94702

Electronic Arts, 2755 Campus Dr., San Mateo, CA 94404; Adventure Construction Set reviewed by Scott Mace (1985) in Personal Computing 9,6:39

Electronic Courseware Systems, 309 Windsor Rd., Champaign, IL 61820; has 14 disk drill and practice English Series

Gessler Educational Software, 900 Broadway, New York, NY 10003, has over 25 games, tutorials, and drill/review disks for French, Spanish, German, and ESL; LIRIC (Language Instruction for Recent Immigrants through Computer Technology), mentioned in CALICO Journal 2,1:17

Gorilla Software, 3604 S.W. 31st Dr.-20C, Gainesville, FL 32608; The Writing Lab and SPICE (revision skills)

Great Plains National Library, Box 80669, Lincoln, NB 68501; Villa Alegre, an Apple II to Pioneer or Sony interfaced interactive video package for ESL or Spanish; noted in Electronic Learning, April (1984):52.

Hartley Courseware, Inc., Box 419, Dimondale, MI. 48821; Verb Usage, Vowels (Mentioned by Baltra, TESOL Convention, Houston 1983)

Hayden Software, 600 Suffolk St., Lowell, MA 01854; The Computer Novel Construction Set

HLS Duplicating Services, 880A Maude Ave., Mountain View, CA 94043; Crossword Magic described in Personal Computing, August 1985.

Holt, Rhinehart and Winston, 383 Madison Ave., New York, NY 10017. Distributing Chris Jones's Storyboard and Clozemaster

Houghton Mifflin Co., P.O. Box 683, Hanover, NH 03755; programs for counseling, reading & language arts, maths, CMI, English MicroLab, etc.

Houston Independent School District, Patsy Rogers (713)-960-8888; notional-functional based digital speech interfaced ESL software

Informaton USA, 4701 Willard Ave., Suite 1707, Chevy Chase, MD 20815; publishes The Federal Data Base Finder to facilitate access to 3000

U.S. Gov't data bases

Instructional/Communications Technology, Inc., 10 Stepar Place, Huntington Sta., New York, NY 11746; Reading Around Words reviewed by Julia G. Blair, and Comprehension Power Program Levels 1-12 reviewed by Lily Yang Hsiao-ning, in CALICO 2,1:40-2 (1984)

Instructional Development Systems, 2927 Virginia Beach Blvd., Virginia Beach, VA 23452. Has "AIDS", an authoring system

Intellectual Software, 798 North Ave., Bridgeport, CT 06606; French Vocabulary Games reviewed by John B. Romeiser in CALICO Journal 2,3:41-2

InterLearn, Box 342, Cardiff by the Sea, CA 92007; Computer Chronicles Newswire, other interactive texts and writers' tools

John D. Owens Associates, Inc., Staten Island, NY; Inrac, a programming language "whose main strength is understanding and speaking English", described in T.H.E. Journal 12,4:68 (1984)

Jostens Learning Systems, Inc., 600 West University Drive, Arlington Heights, IL 60004-1889; UFONIC Voice System, programmable voice synthesis using an interface board and amplifier/speaker

Krell Software Corp., 1320 Stony Brook Rd., Stony Brook, NY 11790; Grammar, What Big Teeth You Have! reviewed by Stephen Mahlum (1984) in CALICO Journal 2,2:39-40; TOEFL noted in Creative Computing 11,2:124 (1985)

L & S Computerware, 1589 Fraser Dr., Sunnyvale CA 94087; Crossword Magic puzzle generator.

LampLighter Software, Inc., 7 Breton Ave., Melville, NY 11747; "Language Lab" interactive audio

The Learning Co., 4370 Alpine Rd., Portola Valley, CA 94025; Rocky's Boots; Robot Odyssey I reviewed by Scott Mace in Personal Computing 9,3:145.

Learning Well, Methods & Solutions, 200 So. Service Rd., Roslyn Heights, NY 11577; That's My Story reviewed by Samila S. Nickell (1984) in CALICO Journal 2,2:40-1

Lingo Fun, Inc., P.O. Box 486, Westerelle, OH 43081; Spanish Idiom Master reviewed in CALICO Journal 2,4:41-2

Living Videotext, Inc., 450 San Antonio Rd., Suite 56, Palo Alto, CA 94306; Think Tank reviewed by Steve Arrants (1983) in Creative Computing 9,11:101-2

Longman's Ltd. is about to introduce a packet of CALL software called QUARTEXT

Macmillan Education, Ltd., Houndsmills, Basingsttoke, Hants RG1 2XS;

Chelsea College Computers in the Curriculum materials (described in CALLBOARD 6)

Mallard Educational Systems, No. 21, 826 10th St. So., Minneapolis, MN 55404; has Language Plus authoring system featuring several CALL formats

Management Science America, 3445 Peachtree Rd. N.E., Atlanta, GA 30326; has 5-volume Writing Skills series

Math and Computer Education Project (MCEP), Lawrence Hall of Science, University of California, Berkeley, CA 94720; "Creative Play" for critical thinking skills

Mc2 - Master Class Corp., 1721 Black River Rd., Rome, NY 13440; CAST Unix-based authoring system

Mesa Community College, Vocational English as a Second Language, VESL Curriculum Project, 1833 W. Southern Ave., Mesa, AZ 85202; SuperPILOT-based vocational ESL materials

Microcomputer Workshops Courseware, 225 Westchester Ave., Port Chester NY 10573. Language arts and foreign language software

Milliken Publishing Co., 1100 Research Blvd., St. Louis, MO 63132; The Writing Workshop reviewed in Apple Education News 5,3:7 and in T.H.E. Journal 12,10:44; Sentence Combining reviewed by Vance Stevens (1985) in CALICO Journal 2,4:41

Milton-Bradley; Reading Comprehension - Main Ideas and Details; students recognize topic sentences, list supporting details, summarize main ideas, choose titles, evaluate details

Mindscape (address not given); Crossword Magic reviewed by Scott Mace (1985) in Personal Computing 9,7:43

Minnesota Educational Computing Corporation; formerly: Computing Consortium (MECC), 2520 Broadway Drive, St. Paul, MN 55113. Has "Programmer's Aid" series, which are subroutine skeletons for user supplied text; Writing a Narrative (Reviewed in Apple Education News 5, #3: 7); library of software available to schools and colleges at nominal costs

National Textbook Co., 4255 West Touhy Ave., Lincolnwood, IL 60646-1975; Basic Vocabulary Builder on Computer for Spanish, French, German, Italian, and ESL

Prentice-Hall, College Marketing-ESL, Englewood Cliffs, NJ 07632; distributes Lin Lougheed's Reading Strategy Series

The Psychological Corporation - Learning Achievement Corporation, 757 3rd Ave., New York NY 10017. PRISM series reading for grades 3-5 and 7 and up. Might apply to ESL

Random House; Fix It (create a machine to accomplish a specific purpose) commented on by David H. Ahl (1985) in Creative Computing 11,9:8

Raptor Systems, Inc., 324 South Main St., Suite 1, Stillwater, Minn 55082; The Author & The Author Plus computer authoring systems

Regents/ALA, 2 Park Ave., New York 10016; various ESL products; Grammar Mastery reviewed by Martha C. Pennington (1984) in CALL News and Reviews 1,1:1,3.

Research Design Associates, Stony Brook, NY; Proteus-The Idea Processor incorporates 5 prewriting strategies; noted in T.H.E. Journal 13,1:32

Ritam Corporation (address not given); Monty Plays Scrabble reviewed by Scott Mace (1985) in Personal Computing 9,7:43

Scandura Training Systems, 1249 Greentree Lane, Narbeth, PA 19072, has 10-disk language arts tutorial, FL disks; does customized programming

Scholastic Wizware (no address given); Mystery Double Feature ("twistaplot" in a haunted house) reviewed by Margaret Chavez (1985) in C.U.E. 8,1:26

Science Research Associates, 155 North Wacker Dr., Chicago, IL 60606 (contact local rep.); SRA Thinkware

Sensible Software, Inc. 24011 Seneca, Oak Park, MI 48237; Report Card CMI program

Shenandoah Software, Box 776, Harrisburg, VA 22801; Puzzle Master for TRS-80 noted in C.U.E. 7,6:25

Spel Tec, 3109 Scotts Valley Dr., Suite 153, Scotts Valley, CA 95066; Word Wars spelling tutor

Springboard Software, 7807 Creekridge Circle, Minneapolis, NM 55435; The Newsroom reviewed by Norman Johnson (1985) in C.A.L.L. Digest 1,5:6-8 and by Carol Crowell (1985) in Creative Computing 11,8:69-71.

Sterling Swift Publishing, 7901 So. IH-35, Austin, TX 78744; Writing with a micro: Before word processing and beyond, reviewed by Diane Strong-Krause (1984) in CALICO 2,1:40

Storybooks of the Future, 527 41st Ave., San Francisco, CA 94121

Sunburst Communications, Inc., 39 Washington Ave., Pleasantville, NY 10570; Puzzle Tanks reviewed in Electronic Learning 4,2 (October, 1984):ESR-4; Missing Links reviewed in C.A.L.L. Digest, Spring:7-8; The Factory described by Irene Dutra, presentation at TESOL '85, New York; also The Incredible Lab

Tandberg of America, Educational Division, 1 Labriola Ct., Armonk, NY 10504; computer-interfacable audio tape players, programmable in BASIC or with InterAct authoring system

Thorn EMI Computer Software, Inc., 1881 Langley Ave., Irvine, CA 92714; Perfect Writer integrated word processing, communications, data management, etc.

Touch Technologies, 609 So. Escondido Blvd., Suite 101, Escondido, CA 92025; Computerized Lesson Authoring System (CLAS)

University of Iowa, Center for Educational Experimentation, Development, and Evaluation (CEEDE), 218 Lindquist Center, Iowa City, IA 52242; ESL & bilingual learning material

University of Northern Iowa, Modern Language Dept. (Malcolm Price Lab School), Cedar Falls, IA 50613; Drill & Filler

University of Pennsylvania, Language Analysis Project, 440 WMS Hall/CU, Philadelphia, PA 19104; PATHWAYS state-table driven authoring software

Videodisc Design/Production Group, KUON-TV, University of Nebraska-Lincoln, P.O. Box 83111, Lincoln, NE 68501-3111, Tel: (402)-472-3611.

WICAT Systems, Box 539, Orem UT 84057 has WISE authoring system, and reading and writing programs

Wida Software, 2 Nicholas Gardens, London W5 5HY, has a number of driver programs (i.e. templates into which you write in your own texts), programs for various foreign languages; Apfeldeutsch reviewed by Hugh Dobbs, Practical Computing, November, 1981.

INTERACTIVE VIDEO: Dave Wyatt, 4614 Chase Ave, Bethesda MD 20814, has a list of 21 "Suppliers of Software and Hardware for Interactive Video".

V. Catalogs

The following companies issue catalogs in which are represented the products of several vendors of educational software.

1984 American Micro Media Catalog, Box 306, Red Hook, NY 12571. 1500 programs from 175 publishers

B. Dalton, P.O. Box 1403, Minneapolis, MN 55440; prints mini-catalog listing software directories, books on programming, games, etc.

Computer Knowledge Center, 205 W. 19th St., New York, NY 10011; books on programming, micros, etc.

The Continental Press, 1984 Micro-software Catalog, 520 E. Bainbridge St., Elizabethtown PA 17022-9989; in addition to catalog, publishes Hively's Choice (see directories, below)

Dilithium Press, P.O. Box 606, Beaverton, OR 97075; books, software, book/software packages

Educational Activities' Microcomputer Software Catalog, P.O. Box 392, Freeport, NY 11520

Educational Computing Catalog, Fisher Scientific/EduMart Computer Division, 1458 N. Lamon Ave., Chicago, Ill. 60651

Follet's Quality Courseware Catalog, Follet Library Book Co., Crystal Lake, Ill.

K-12 Micromedia, 172 Broadway, Woodcliff Lake, N.J. 07675; provides free backup of all protected educational software.

Learning Arts Educational Computer Software Catalog, P.O. Box 179, Wichita, KS 67201

Merit Computer Resource Center, 3701 N.W. 50th, Oklahoma City, OK 73112

The Micro Center, P.O. Box 6, Pleasantville, NY 10570

MicroPro, 33 San Pablo Ave, San Rafael, CA 94903; training aids (i.e. Wordstar, etc.) for educators at substantial discounts through Software Endowment Program

Monument Computer Service, P.O. Box 603, Joshua Tree, CA 92252; (request education catalog A-84)

Opportunities for Learning, Inc., 8950 Lurline Ave., Dept. 60 M.F., Chatsworth, CA 91311 -or- 20417 Nordhoff St., Dept. P, Chatsworth, CA 91311

Quality Educational Microcomputer Software, Charles Clark, Co., 168 Express Dr., Brentwood, NY 11717

Scholastic, Inc., 730 Broadway, New York, NY 10003 Scholastic, Inc. -or- 904 Sylvan Ave., Englewood Cliffs, NJ 07632

SIMPAC Educational Systems, 1105 N. Main St. - Suite 11C, Gainesville, Fla. 32601; "meritorious software for the discriminating educator", some developed by SIMPAC

Sunburst Educational Computer Courseware, Room BD 9 3, 39 Washington Ave., Pleasantville, NY 10570.

TAB Books, Inc. P.O. Box 40, Blue Ridge Summit, PA 17214; books, software, and book/software packages, especially programming and utilities

WineWare Software for Schools, 145 Heritage Ave., Portsmouth, NH 03891

VI. Software Directories

The following entities publish directories which serve to evaluate and catalog (but not sell) various educational software products:

Addison-Wesley Books of 1985 Software; list best free public domain programs running on Apple, IBM, Atari, and Commodore; in THE 12,9:76 (May, 1985)

Apple Educator's Information Booklet. Apple Computer, 10260 Bandley Dr., Cupertino CA 95014

the Apple Journal of Courseware Review, The Apple Foundation, Box 28426, San Jose, CA 95159

Apple Software Directory. WIDL Video, 5245 W. Diversey Ave., Chicago, Ill. 60639

The Book of Apple Computer Software. The Book Co., 16720 Hawthorne Blvd., Lawndale CA 90260. (Has an education section; lists vendors)

Classroom Computer News Directory of Educational Computing Resources, 1983. Intentional Educators, 341 Mt. Auburn St., Watertown, MA 02172

Computer Coursware Catalog. New York: Bilingual Publications and Computer Services, Inc.

Digest of Software Reviews: Education; 301 West Mesa, Fresno, CA 93704.

Educational Products Information Exchange (EPIE), Box 839 B, Water Mill NY 11976. PRO/FILES extensively evaluates microcomputer courseware and hardware. Also publishes TESS (The Educational Software Selector), whose 1985 version reviews over 7000 pieces of educational software; abstracted in Journal of Computer-Based Instruction 12,3:86 (1985)

Educational Software Directory, Swift Publishing Co., P.O. Box 188, Manchaca, TX 78652. (Different editions for different computers; well indexed)

Educational Software Evaluation Consortium (ICCE), University of Oregon, 1787 Agate St, Eugene, OR 97403-1923; publishes the 1984 Educational Software Preview Guide

Educational Software Sourcebook: First Edition. Fort Worth, TX: Tandy Corp.

Evaluations: Microware; 7351 Elmbridge Way, Richmond, B.C., Canada V6X 1B8

Far West Laboratory for Educational Research and Development, 1855 Folsom St., San Francisco CA 94103. Disseminates 1984 Directory of Resources for Technology in Education

Hively's Choice, 520 E. Bainbridge St., Elizabethtown PA 17022-9989. Reviews 100 programs in reading/language arts and other subjects

Library Software Review, 520 Riverside Ave., Westport, CT 06880

MicroSIFT Reviews, 300 S.W. 6th Ave., Portland, OR 97204.

Personal Software, Box 2919, Boulder, CO 80322

School Microware Reviews, Dresden Associates, Box 246, Dresden, ME 04342

SECTOR (Special Education Computer Technology Online Resources) Project, Exceptional Child Center, UMC-68, Utah State University, Logan, UT 84322

The Software Catalog, Elsevier Science Publishing Co., Inc., P.O. Box 1663, Grand Central Station, New York, NY 10163; 5 editions cater to various interests, but none specifically to education.

Software Locator Survey Results, Associated Technology Software, RT2 Box 448, Estill Springs, TN 37330

Software Reports (Guide to Evaluated Educational Software), 2101 Las Palmas Dr., Carlsbad, CA 92008 -or- from Trade Service Publications, Inc., 10996 Torreyana Rd., San Diego, CA 92121

Software Review, Microform Review, 520 Riverside Ave, Westport, CT 06880

Vanloves Apple II/III Software Directory. Vital Information, Inc. 7899 Mastin Dr., Overland Park, Kansas 66204

Some Upcoming Publications

Bridwell, Lillian, Parker Johnson, and Stephen Brehe. Forthcoming. Composing and computers: Case studies of experienced writers. In Matsuhashi, Ann (Ed.), Writing in real time: Modelling production processes. New York: Longman.

According to Schwartz and Bridwell (1984:72-3), this article "Traces how eight experienced writers used different composing processes as they learned to write with a word processing program. Discusses implications for introducing word processing to students in writing class."

Bridwell, Lillian, Geoffry Sirc, and Robert Brooke. Forthcoming. Revising and computing. In Freedman, Sarah (Ed.), The acquisition of written language: Revision and response. Norwood, NJ: Ablex.

According to Schwartz and Bridwell (1984:73), this article

"Reports on the ways five undergraduate students used word processing for revision, drawing upon an absolute keystroke record of the writers' revision on the computer. Also discusses responses from a survey of students who have used computers for writing in The University of Minnesota's Composition Program."

Cook, V.J., and D. Fass. Natural language processing by computer and language teaching. manuscript; shows applications of parsing to CALL.

Corbett, Grenville G., Kurshid Ahman, Margaret Rogers, and Roland Sussex have a book entitled 'Computers in language learning: An introduction for Teachers': Cambridge University Press. Due out late 1984.

Davies, Graham. Talking BASIC. Holt-Saunders (Cassell); focus on string handling; due out April, 1985.

Freedman, Sarah (Ed.). The acquisition of written language: Revision and response. Norwood, NJ: Ablex. Will contain report of computer-assisted research into writing process by Bridwell, Lillian, Geoffrey Sirc, and Robert Brooke: "Revising and computing."

Jones, Chris. Preparing a book on CALL to appear in the Longman handbook series.

Leech, Geoffrey, and Christopher Candlin (Eds.). Computers and the English language. Longman.

Lian, A.-P. 1985 (forthcoming). An exprimental computer-assisted listening comprehension system. Review de Phonetique Appliquee.

Matsuhashi, Ann (Ed.). Writing in real time: Modelling production processes. New York: Longman. Will contain research dealing with writing and word processing by Bridwell, Lillian, Parker Johnson , and Stephen Brehe: "Composing and Computers: Case studies of experienced writers."

Undated Publications

Publications for which publication date is unknown to this bibliographer:

Bell, Frederick H. Apple programming for learning and teaching. Reston, VA: Reston Publishing Co.; noted in T.H.E. Journal 11,7:85 (1984).

Burrows, S., and T. Burrows. Improving CAI in BASIC. Eugene, OR: International Council for Computers in Education; noted in T.H.E. Journal 13,1:39 (1985).

Chambers, J., and J. Sprecher. Computer-assisted instruction: Its use in the classroom. Englewood Cliffs, NJ: Prentice-Hall, Inc.; noted in

T.H.E. Journal 11,7:66 (1984).

Charniak, E., and Y. Wilks, Eds. Fundamamental Studies in Computer Science 4: Computational Semantics. Amsterdam: North Holland Pub. Co.

Collins, Allan. Teaching Reading and Writing with Personal Computers. Cambridge: Bolt Beranek and Newman, Inc.

Computers in composition instruction. Eugene, OR: International Council for Computers in Education; noted in T.H.E. Journal 11,8:72 (1984).

Courseware in the classroom: Selecting, organizing, and using educational software. Reading, Mass.: Addison-Wesley.

Educational Software Sourcebook: First Edition. n. d. Fort Worth, Texas: Tandy Corporation.

Gamble, Andy. Text analysis. Commodore: The Microcomputer Magazine, Issue 28:33,64-8.

The program described and listed here implements Gunning's Fog Index (for clarity of text) and the Fry Index to assess readability of written prose. Particular attention is given in the program to crash proofing, allowing commas in input, and analysis of text during typing (at the expense, unfortunately, of the delete function, which is disenabled). The listing is followed by a sample run from Jabberwocky; coded for PET/CBM Basic 2.0 or 3.0 with at least 8K. (Photocopy seen 9/1985)

Gayeski, D., and D. Williams. Interactive Media. Englewood Cliffs, NJ: Prentice Hall, Inc.; noted in T.H.E. Journal 12,9:53 (1985).

Gehani, Narain. C: An advanced introduction. Rockville, MD: Computer Science Press, Inc. Noted in T.H.E. Journal 12,8:58 (1985).

Geoffrion, L., and O. Geoffrion. Computers and reading instruction. Reading, MA: Addison-Wesley; noted in T.H.E. Journal 11,8:78 (1984).

Hall, Thomas. Learning to program in C. Cardiff, NJ: Plum Inc.; noted in T.H.E. Journal 11,7:90 (1984).

Hertz, Robert, and Joseph Jacobs. Microcomputer-based ESL and foreign language instruction. Los Alamitos, CA: National Center for Bilingual Resources; noted in T.H.E. Journal 12,1:60 (1984).

Hortin, John A. Successful examples of instructional technology in higher education. ERIC ED 208 726.

Malone, Thomas. What makes computer games fun? In Peterson, Dale (Ed.), Intelligent schoolhouse: Readings on computers & learning. Reston, VA: Reston Publishing Co. Reviewed in Electronic Learning 4,2 (October, 1984):95.

BEST COPY AVAILABLE

Manning, D. Thompson, Donald G. Ebner, Franklin R. Brooks, and Paul Balson. Interactive videodiscs: A review of the field. (references used are from 1978 to 1982)

Orwig, G., and W. Hodges. The computer tutor: Apple computer edition. Boston, MA: Little, Brown, & Co. Lists 25 interactive programs; noted in T.H.E. Journal 12,8:59 (1985).

Powers, Richard S. Computer-assisted English instruction; ERIC ED 199 762.

Ragsdale, Ronald G. Computers in the schools: A guide for planning. Toronto: OISE Press. (Ontario Inst. for Studies in Education, 252 Bloor St. West, Toronto, Ontario, M5S 1V6)

Ragsdale, Ronald G. Evaluation of Microcomputer Courseware. Toronto: OISE Press. (Ontario Inst. for Studies in Education, 252 Bloor St. West, Toronto, Ontario, M5S 1V6).

Ramsden, Elizabeth (Ed.). Microcomputers in education 2. Somerset, NJ: John Wiley & Sons; noted in T.H.E. Journal 12,9:56 (1985).

Schank, Roger C., and Peter G. Childers. The cognitive computer: On language, learning, and artificial intelligence. Reading, MA: Addison-Wesley. Reviewed by Jeffrey Bairstow in Personal Computing, August 1985.

Shade, Gary A. Speech systems for your microcomputer. Peterborough, NH: Wayne Green Book; noted in T.H.E. Journal 11,8:78 (1984).

Truett, C., and L. Gillespie. Choosing educational software: A buyer's guide. Littleton, CO: Libraries Unlimited; noted in T.H.E. Journal 11,8:78 (1984).

Winston, Patrick Henry. Artificial intelligence. Reading, MA: Addison-Wesley; noted in T.H.E. Journal 12,2:73 (1984).

Yazdani, Masoud (Ed.). New horizons in educational computing. New York, NY: John Wiley & Sons; reported in T.H.E. Journal 12,2:76 (1984) to focus on AI applications in education.

ACKNOWLEDGEMENT

I would like to acknowledge the assistance of the many friends and colleagues whose contributions have been incorporated into this bibliography. Unfortunately (or fortunately, as the case may be), the number of such individuals has become so large as to preclude my continuing to acknowledge each separately, as I have done in past versions of this bibliography. Therefore, since those who have helped almost certainly do not expect an acknowledgement, and since those whom I have in the past acknowledged are most probably unaware that I have done so -- but mainly out of fear of my leaving someone out -- I will resort here to this blanket expression of appreciation, which I hope will suffice.

This bibliography is maintained on an ongoing basis; hence the author welcomes feedback, corrections, additions, etc., at the following address:

Vance Stevens
Language Centre
Sultan Qaboos University
P.O. Box 6281, Ruwi
Muscat, Sultanate of Oman